

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
NEWPORT NEWS DIVISION**

**PATRICK A. LAUGHLIN
and DEBORAH J. LAUGHLIN,**

Plaintiffs,

v.

**AIR & LIQUID SYSTEMS
CORPORATION, Successor by Merger to
BUFFALO PUMPS, INC., *et al.*,**

Defendants.

Case No. 4:18-cv-132-AWA-RJK

**PLAINTIFFS' NINTH SUPPLEMENTAL RULE 26(a)(1) DISCLOSURES OF
PATRICK A. LAUGHLIN AND DEBORAH J. LAUGHLIN**

Plaintiffs, PATRICK LAUGHLIN and DEBORAH J. LAUGHLIN, by and through their attorneys, pursuant to Fed. R. Civ. P. 26(a)(1), and this Court's Order (ECF 259) granting Plaintiffs' Motion for Leave to Substitute an Expert (ECF 253), hereby provide the following ninth supplemental disclosure after making such good faith inquiry and investigation as was reasonable under the circumstances.

Plaintiffs' disclosure was prepared based on information known to Plaintiffs as of the date of this disclosure. Discovery and investigation are continuing. As such, Plaintiffs reserve the right to make use of, or introduce as evidence at the trial of this matter, and information disclosed or developed through the investigation or discovery subsequent to the date of this disclosure. Furthermore, Plaintiffs reserve the right to correct or amend this disclosure should they become aware of any inadvertent omission or inaccuracy that they subsequently discover and determine to be relevant.

Subject to the foregoing, Plaintiffs add the following Ninth Supplemental Rule

26(a)(1) disclosures, annotated in bold font below as follows:

1. FACTUAL WITNESSES SPECIFIC TO LAUGHLIN

(A)(i) – The name and if known, the address and telephone numbers of each individual likely to have discoverable information relevant to disputed facts alleged with particularity in the pleadings, identifying the subjects of information:

(a) Plaintiffs

Patrick A. Laughlin
1764 King Avenue, Dayton, Ohio 45420
(937) 253-6239

Mr. Laughlin has information relating to his exposure to uncontrolled asbestos from the Defendants' products and equipment; his work methods; the lack of warnings on the Defendant's products and equipment that he worked with and around during his service aboard the USS Conyngham; his propensity for safe work practices; his medical treatment and associated expenses; and the many damages that he has suffered as a consequence of his mesothelioma.

Deborah J. Laughlin
1764 King Avenue, Dayton, Ohio 45420
(937) 253-6239

Mr. and Mrs. Laughlin have been married for over 46 years. Deborah Laughlin has information relating to her damages for spousal loss of society and loss of consortium. She also will have information relating to Mr. Laughlin's pain and suffering as well as information relating to his medical expenses, the loss of income, services, protection, care and assistance of Mr. Laughlin provided prior to his mesothelioma.

(b) Exposure Witnesses

Plaintiffs' investigation for knowledgeable co-workers and shipmates is ongoing. There may be additional individuals identified in Patrick Laughlin's military records, his personal notebooks, or the ship muster rolls provided in the Plaintiff's response to Standard Answer to Interrogatories and Requests for Production of Documents regarding the identity of individuals who may have information relating to Patrick A. Laughlin's work with and around the Defendants' asbestos-containing products. Discovery is ongoing. At this time, Plaintiffs are aware of the following individuals:

Daniel T. Mannerino
6008 Schoolhouse Woods Road, Apartment R
Burke, Virginia 22015

Daniel T. Mannerino served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. Mannerino may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

Terry M. Buck
1402 Lynnwood Drive
Johnson City, TN 37601

Terry M. Buck served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. Buck may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

Kenneth H. Croley
169 N. Circle Drive
Caryville, TN 37714

Kenneth H. Croley served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. Croley may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

Raymond A. Stover
3700 Lacon Rd., Suite C
Hilliard, OH 43026

Raymond A. Stover served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. Stover may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

John R. Goetter
5411 N. Poudre Dr.
Tucson, AZ 85743

John R. Goetter served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. Goetter may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

Ricky A. LaPorte

W304N2431 Maple Avenue
Pewaukee, WI 53072

Ricky A. LaPorte served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. LaPorte may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

Michael G. Dierking
4808 Cerromar Drive
Naples, FL 34112

Michael G. Dierking served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. Dierking may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

Larry E. Lalime
69135 Brush Trail
Niles, MI 49120

Larry E. Lalime served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. Lalime may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

Bruce W. Hagerman
19 Pierrepont Avenue
Middlesex, NJ 08846

Bruce W. Hagerman served on the USS Conyngham (DDG-17) with Patrick Laughlin. Mr. Hagerman may have personal information and knowledge related to Patrick Laughlin's exposure to uncontrolled asbestos from the Defendants' products and equipment; Laughlin's work methods; his propensity for safe work practices; and the lack of warnings on the Defendant's products and equipment that Laughlin worked with and around during his service aboard the USS Conyngham.

FIRST SUPPLEMENTAL DISCLOSURE OF EXPOSURE WITNESSES:

James H. Shoemaker
152 The Green
Williamsburg, VA 23185

In addition to any of the individuals previously identified, or any other individuals identified in the course of discovery, Plaintiffs may call James H. Shoemaker to testify about ship repair, scheduling and work execution. He has knowledge regarding the valves, pumps and

equipment onboard Navy ships, the personnel involved in an overhaul and their duties. He has knowledge of the asbestos gasket and packing applications both at Newport News Shipyard and Norfolk Naval Shipyard and the methods of fabrication, removal and installation, and the tools used for these activities.

(c) Plaintiffs' Family and Friends

Heather Parlette
3904 Coppertree Court
Dayton, OH 45424

Carrie Harry
2704 Whittier Avenue
Dayton, OH 45420

Rachael Ritchie
44 Anderson Street
Dayton, OH 45410

Heather Parlette, Carrie Harry, and Rachael Ritchie are the daughters of Patrick and Deborah Laughlin. They have knowledge regarding Patrick Laughlin's pain and suffering from mesothelioma, as well as Deborah Laughlin's damages for pre-death loss of society and loss of consortium. They may have information regarding any other damages that their parents may be entitled to as a consequence of their father's mesothelioma. They may also have information relating to their father's medical expenses, loss of income, services, protection, care and assistance that have resulted as a consequence of his mesothelioma.

(d) Treating Physicians

Thomas Joseph Merle, M.D.
Kettering Cardiothoracic & Vascular Surgeons, Inc.
3533 Southern Blvd., Suite 5650
Kettering, Ohio 45429

Dr. Thomas Joseph Merle is Patrick Laughlin's cardiothoracic surgeon. Dr. Merle performed a right video-assisted thoracoscopic (VAT) surgery with biopsy, drainage of pleural effusion and a two-level intercostal nerve block. Dr. Merle may testify generally about the surgery that he performed. He may testify about the findings of the biopsies that were obtained in the surgery. He may testify about why he performed a two-level intercostal nerve block. He may testify about the diagnosis of mesothelioma that was made. He may testify regarding his basis for performing the VAT along with his treatment of Patrick Laughlin, leading up to and following the VAT. He may testify regarding any complications that Mr. Laughlin experienced as a consequence of this surgery, and he will testify about Mr. Laughlin's recovery. He may testify regarding his decision to insert a chest tube in order to drain Mr. Laughlin's pleural effusion. Dr. Merle may testify about the reasonableness and necessity of Mr. Laughlin's treatment and medical bills as reflected in Mr. Laughlin's medical chart and bills. Dr. Merle may testify regarding principles of

general causation between asbestos and mesothelioma. He may testify about Mr. Laughlin's prognosis and the probable course that his mesothelioma will take.

Heather Riggs, M.D.
Kettering Cancer Center
3700 Southern Blvd.
Kettering, Ohio 45429

Dr. Heather Riggs is Patrick Laughlin's oncologist. She may have information about her treatment and care of Patrick Laughlin. She may testify about the chemotherapy treatments that she recommended in Mr. Laughlin's case. She may testify about any and all complications that Mr. Laughlin experienced as a consequence of the chemotherapy including but not limited to nausea, vomiting, hypotension, dehydration, acute renal failure. She may testify about drug induced constipation, and cancer related pain that Mr. Laughlin experiences. She may testify about the effectiveness of the prescribed chemotherapy. She may testify about other treatment modalities that are available to Mr. Laughlin. about the VAT procedure that was performed. She may testify about the pleural effusion, pleural fluid build-up, VAT surgery, and the 28-French chest tube that was inserted in Patrick Laughlin's chest to assist with pleural fluid drainage. She also has knowledge of the side effects of Patrick Laughlin's chemotherapy, and the effects of mesothelioma on Patrick Laughlin. She may testify about Mr. Laughlin's prognosis and the probable course that his mesothelioma will take. Dr. Riggs may testify about the reasonableness and necessity of Mr. Laughlin's treatment and medical bills as reflected in his medical chart and bills. She may testify as to the probable cost of future medical care and treatment in Mr. Laughlin's case. Dr. Riggs may testify regarding principles of general causation between asbestos and mesothelioma.

Ersie Pouagare, M.D.
Kettering Medical Center
3535 Southern Blvd.
Kettering, Ohio 45429

Dr. Ersie Pouagare is a pathologist at Kettering Medical Center who reviewed Patrick Laughlin's pathology and made a diagnosis of mesothelioma. He also forwarded the pathology to the University of Michigan, Department of Pathology, which confirmed the diagnosis of malignant mesothelioma, epithelioid type. Dr. Pouagare will testify consistent with the medical treatment and diagnosis provided to Patrick Laughlin as reflected in Mr. Laughlin's medical records. He may also testify about the reasonableness and necessity of Mr. Laughlin's treatment and medical bills as reflected in Mr. Laughlin's medical records and bills.

Vernesha Montgomery, M.D.
Primary Care - Southmoor
500 Lincoln Park Blvd., Suite 200
Kettering, Ohio 45429

Dr. Vernesha Montgomery is Patrick Laughlin's primary care physician. Dr. Montgomery will testify consistent with the medical treatment and diagnosis provided to Patrick Laughlin as reflected in Laughlin's medical records. Dr. Montgomery may testify about her treatment and care of Patrick Laughlin, his health prior to the diagnosis of mesothelioma, and his treatment leading

up to the diagnosis of mesothelioma. She may testify about his prognosis and the probable course that his mesothelioma will take. Dr. Montgomery may testify about the reasonableness and necessity of Mr. Laughlin's treatment and medical bills as reflected in his medical chart and bills. She may testify as to the probable cost of future medical care and treatment in Mr. Laughlin's case. Dr. Montgomery may testify regarding principles of general causation between asbestos and mesothelioma.

Dr. Jeffrey L. Myers
Michigan Medicine
Department of Pathology/Anatomic Pathology
1500 East Medical Center Drive
Ann Arbor, Michigan 48109

Dr. Jeffrey L. Myers reviewed the pathology materials of Patrick Laughlin at the request of Ersie Pouagare, M.D., and confirmed the diagnosis of mesothelioma. Dr. Myers will testify consistent with the medical treatment and diagnosis provided to Patrick Laughlin as reflected in Laughlin's medical records. He may also testify about the reasonableness and necessity of Mr. Laughlin's treatment and medical bills as reflected in Mr. Laughlin's medical records and bills.

Patrick Laughlin has seen a number of physicians in the course of his diagnosis and treatment for mesothelioma. See Patrick Laughlin's available Medical Records previously provided as Exhibit 9 to the Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents, which list each physician that has treated him. Patrick Laughlin's medical treatment is ongoing and providers known to date are identified. Plaintiffs reserve the right to supplement and amend this list as Patrick Laughlin's treatment continues. Plaintiffs are not aware of the specific health information these medical practitioners may have, but list them because they are identified in Patrick Laughlin's health records.

Each of these doctors will testify consistent with the medical treatment and diagnosis provided to Mr. Laughlin as reflected in his medical records. These physicians may also testify concerning any procedures and treatment, as well as the clinical significance of Mr. Laughlin's treatment, surgery, and diagnosis of mesothelioma as part of their explanation of Mr. Laughlin's treatment, and diagnosis as reflected in his medical records. Any of these doctors may also testify about reasonableness and necessity of Mr. Laughlin's treatment and medical bills as reflected in his medical records and bills.

2. EXPERT WITNESSES

(a.) Retained Experts.

At this time, Plaintiffs have retained the following experts. Additional experts may be retained and identified as the case progresses. Additional information about the following experts is set forth in Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents, which were previously provided to the Defendants in this case.

John C. Maddox, M.D.
Department of Pathology
Riverside Regional Medical Center

Newport News, Virginia 23601
(757) 594-2870

Dr. Maddox will testify in accordance with his report, which will be produced in accordance with the pretrial scheduling order entered in this case. By way of general summary, Dr. Maddox is a Board-certified pathologist who will testify concerning his education, training, personal experience and study concerning the diagnosis and causation of asbestos-related diseases. Dr. Maddox will provide information regarding the general causation of mesothelioma and other asbestos-related diseases from exposure to all types of asbestos fibers, i.e. chrysotile, tremolite, amosite, and crocidolite. He will also testify regarding the different types of asbestos-related diseases, their dose response characteristics, the impact or significance, if any, of one asbestos-related disease with respect to another asbestos-related disease, the development of knowledge in the scientific and medical literature of the various asbestos-related disease, and the etiology and histology of the various asbestos-related diseases. Dr. Maddox will also provide testimony as to the response of the body's defense mechanisms to asbestos fibers, the translocation of asbestos fibers from the lung to the pleura, the mechanisms of carcinogenesis, the relative biopersistence of different types of asbestos fibers in the lung and pleura, the concept of individual susceptibility, the capability of low-dose asbestos exposure to cause mesothelioma, the relative, qualitative potency of various different types of asbestos fibers, the methodology for determining general causation of mesothelioma from asbestos exposure, the methodology for determining specific causation of mesothelioma in a particular human being, his review of Patrick Laughlin's medical records, his review of Laughlin's respective pathology, to the extent that this material is available, his review of the sworn answers to interrogatories of the Plaintiff, the depositions of the Laughlin and any coworker witnesses (as they occur), and the published and unpublished scientific literature and testing of respirable asbestos fiber release from the intended use of various asbestos-containing products and equipment, including asbestos-containing gaskets and packing. Dr. Maddox will testify regarding the specific causation of Patrick Laughlin's mesothelioma. Dr. Maddox will also testify that that Patrick Laughlin's mesothelioma and its complications will eventually cause his death.

William E. Longo, Ph.D.
Materials Analytical Services, Inc.
3945 Lakefield Court
Suwanee, GA 30024
(770)-866-3208

Dr. Longo will testify in accordance with his report, which will be produced in accordance with the pretrial scheduling order entered in this case. By way of general summary, Dr. Longo is a material scientist and will testify concerning his testing of various asbestos-containing products, including asbestos gaskets and packing, pipecovering, cement, cloth and other asbestos products. He will further testify regarding the various methodologies for testing asbestos products to determine whether they contain asbestos, to identify and count respirable asbestos fibers released from the use of asbestos-containing products, including gaskets and packing, and to visualize dust from the use of asbestos-containing products that is otherwise invisible to the naked eye. He will further testify about the characteristics of asbestos fibers, as distinguished from particles, and the methodologies for determining asbestos fiber type and concentrations from work methods employed by Laughlin, including the methodology and uses of various microscopes to identify

and characterize asbestos fibers and fiber types and concentrations of asbestos during laboratory experiments. He will also discuss the published and unpublished scientific literature and reports concerning the history and testing of asbestos-containing products, including asbestos gaskets and packing.

David Rosner, Ph.D., MPH
Columbia University
Ronald H. Lauterstein Professor of Sociomedical Sciences
and History and Co-Director, Center for the History of Ethics of Public Health
Department of Sociomedical Sciences
School of Public Health
722 West 168th Street, 9th Floor
New York, NY 10032
(212) 305-1727

Dr. Rosner will testify in accordance with his report, which will be produced in accordance with the pretrial scheduling order entered in this case. By way of general summary, Dr. David Rosner is a professor of history and of sociomedical science at the School of Public Health at Columbia University. Dr. Rosner has a Ph.D. in the History of Science and a Master's Degree in Public Health. Dr. Rosner will testify concerning the history of scientific knowledge about the biological and toxicological effects of asbestos and how this knowledge increased through the 1920s, 30s, 40s, 50s, 60s and 70s. He will also testify regarding his review of the literature and the opinions and conclusions contained in that scientific literature. Dr. Rosner will discuss the roles of private and governmental organizations in reacting to and distributing information regarding the dangers of asbestos. He will discuss the state of the historical knowledge of asbestos cancer risks and other diseases from asbestos exposure. Dr. Rosner will testify that, based on the medical and scientific literature available to the Defendants and/or on studies they conducted or the information reasonably available to them in the scientific and medical literature and as members of trade associations, and from state or federal agencies or associations, Defendants knew or should have known, and had reason to know, that their asbestos-containing products would cause preventable fatal diseases when used in their intended manner or in a manner reasonably foreseeable to Defendants. Dr. Rosner will testify about the exposure levels of asbestos, what levels asbestos were found to cause the various asbestos-related diseases, and when this link between asbestos exposure and these various asbestos-related diseases was known in the medical and scientific literature.

Dr. Terry Spear, Ph.D.
Montana Tech of the University of Montana
1300 W. Park Street
Butte, MT 59701
(406) 496-4897

Dr. Spear will testify in accordance with his report, which will be produced in accordance with the pretrial scheduling order entered in this case. By way of general summary, Dr. Spear has a B.A. Degree in Microbiology from the University of Montana, and a M.S. and Ph.D. in Industrial Hygiene from the University of Minnesota. He is presently a professor emeritus at Montana Tech

and serves as the coordinator for the M.S. Industrial Hygiene Distance Learning Program. From 1997-2012, Dr. Spear was a tenured, full professor and served as the Head of the Safety, Health and Industrial Hygiene Department at Montana Tech. He has taught undergraduate and graduate courses in Occupational Safety and Health and Industrial Hygiene and is active in industrial hygiene research pertaining to aerosol exposure and respiratory protection. Dr. Spear has also worked as an industrial hygienist for Honeywell and Sperry Univac in Minnesota and for EG&G Inc. at the Idaho National Engineering Laboratory. Dr. Spear has extensive experience in the field of industrial hygiene, particularly with respect to asbestos and asbestos exposure.

Dr. Spear will testify regarding the history of industrial hygiene, generally and as it pertains to asbestos. He may testify that it has been known since the early 1900s that toxic dust controls and warning hazards of toxic dust, and in particular asbestos dust and fibers throughout the 1920s, 30s, 40s, 50s, and 60s. He may also testify about the sources and evolution of “threshold limit values” (TLVs) and “maximum allowable concentrations” (MACs) and “permissible exposure limits” (PELs), and what these various levels mean in terms of personal protection and whether and to what extent they pertain to particular diseases. Dr. Spear may also discuss and explain industrial hygiene terms including, without limitation, friability, dose, and encapsulation. Dr. Spear will testify about the concepts of fiber drift, re-entrainment, and settling rates as they apply to worker and bystander exposure. In the course of this testimony, he will discuss the variables that affect each of these matters. Dr. Spear may testify that attempts to calculate specific past exposures to asbestos (“dose reconstruction”) is a purely speculative venture because it is impossible to control all the many variables including the work environment and the practices used that affected an individual's past exposures on a day-to-day basis on a ship or in a shipyard.

Dr. Spear may further testify about the visibility of asbestos dust and fibers. He will testify that the concentrations of asbestos must extremely high before it is visible to the naked eye in ordinary light and that historically, high intensity light beams, or Tyndall lighting, was an accepted industrial hygiene tool to locate sources of asbestos dust release and visualize the flow of the dust cloud. He may further testify about ambient levels of asbestos when there is no point source of exposure, and how those levels compare to the high occupational levels at issue in this case.

Dr. Spear may also testify about the historical industrial hygiene controls that were first recognized in the 1930s and are still valid today. These include educating workers, providing respirators, wetting down products, and providing local exhaust ventilation. As part of educating workers, Dr. Spear will discuss the need for warnings, the elements of effective, adequate warnings, and the state-of-the-art history of the development and knowledge about warnings within the relevant industries and in the industrial hygiene community.

Dr. Spear has reviewed Dr. Longo's testing and other published and unpublished testing concerning the foreseeable use, removal, and fabrication of asbestos-containing gaskets and packing. Based on these studies and tests, as well as his experience and the scientific literature, he will give opinions concerning the potential ranges of exposure that Mr. Laughlin likely received from various activities involving asbestos gaskets and packing described in his sworn interrogatories, Laughlin's testimony and by the testimony of their co-workers and shipmates.

George R. Neil, Ph.D.
Thomas Jefferson National Accelerator Facility
12000 Jefferson Avenue
Newport News, Virginia 23606

To the extent necessary to address matters Plaintiffs anticipate may be raised by the Defendants, Plaintiffs may call George R. Neil, Ph.D., to testify in accordance with his report, which will be produced in accordance with the pretrial scheduling order entered in this case. By way of general summary, Dr. Neil was the Principal Scientist of Jefferson Laboratory in Newport News, Virginia. He was formerly Associate Director of the Lab and Head of the Free Electron Laser Division.

Dr. Neil has over 30 years of experience in particle physics, plasma physics, accelerator technology, optical technology and Free Electron Lasers (FELS). His primary responsibilities at Jefferson Lab over the last twenty-seven years have been to advance the technology of particle accelerators and high-power laser systems, develop high power FEL technology, and to manage the beam research and user operation of the facility for basic and applied studies in a safe and scientifically productive way. Dr. Neil's experience and education make him an expert in the field and subject of light scattering from airborne particles and the formulas and principles of physics that determine what is seen in the scattered light of a dust cloud as recorded by video cameras from the interaction of light and airborne particles. He is an expert in the variables of light intensity and direction, the light source, distance, angle of the airborne particles, camera specifications and performance, particle size, concentration, and other related factors.

Dr. Neil has reviewed reports and materials from Dr. Longo and his research company, MAS, involving Tyndall lighting to illustrate airborne asbestos dust, as well as reports and materials critical of Dr. Longo's work practice studies concerning asbestos-containing products (including asbestos gaskets and packing) and use of high intensity light beam illumination (Tyndall lighting) to visualize dust production and flow, and independent scientific materials on the subject. He has reviewed the prior reports and testimony of Dr. William Longo and the Defendants' expert, Dr. Lambertus Hesselink.

Dr. Neil will testify that the Tyndall lighting in the Longo videos reliably visualizes the production and flow of dust from work with asbestos products that include respirable airborne asbestos fibers, and that Tyndall lighting is a scientifically valid visualization technique to show the scattered light from materials including groups of respirable airborne asbestos fibers in a cloud. Dr. Neil will testify that the testing, reports, and conclusions of Dr. Hesselink are not scientific or reliable.

[Shoemaker disclosure intentionally omitted – see below]

Plaintiffs may identify an economist, who has not yet been determined, who will testify to the present-day value of Laughlin's lost wages. He will also testify as to the present-day value of Laughlin's lost household services. Plaintiffs will supplement this disclosure as soon as an economist has been retained.

FIRST SUPPLEMENTAL DISCLOSURE REGARDING RETAINED EXPERTS:

Plaintiffs withdraw James H. Shoemaker as a potential expert witness in this matter, but may offer him as a fact witness. See Supplements to Section 1b and 2b herein.

By way of further response, Plaintiffs refer the Defendant to Plaintiffs' Proffer of Potential Rule 702, 703, 705 Expert Witnesses in this matter for identification of additional expert witnesses, their field of expertise and occupations, including the experts identified herein, as well as Dr. Edward Cross, Mr. Frank Duffy, and Captain Bruce Woodruff identified in Plaintiffs' Proffer of Potential Rule 702, 703, 705 Expert Witnesses provided this same day.

SECOND SUPPLEMENTAL DISCLOSURE REGARDING RETAINED EXPERTS: Pursuant to the Court's Order (ECF 259) permitting substitution of an expert in light of the death of Captain William Lowell, Plaintiffs identify the following expert:

Commander Andrew A. Ott
ANDREW A OTT, Inc.
PO Box 64301
Virginia Beach, VA 23467
757-748-6153

To the extent necessary to address a variety of defenses Plaintiffs anticipate may be raised by John Crane, Inc., Plaintiffs may call Commander Andrew Ott to testify in accordance with his report, which is provided this day to John Crane, Inc. By way of general summary, Commander Ott is a degreed experienced Mechanical Engineer specializing in marine engineering matters. His skill, training and experience include, but are not limited to, his education and career in the field of marine engineering from 1966 to the present. Commander Ott's findings and opinions related to Laughlin's exposure to asbestos materials, including asbestos gasket materials and asbestos packing materials, are based upon his personal knowledge, experience and recollections gathered throughout his 24-year Navy career involving the engineering machinery and equipment of steam-powered ships and his work at various naval ship repair facilities, his subsequent 20-year civilian career in maritime engineering practice and management primarily supporting Navy engineering programs, and over ten years' experience in consulting practice as a marine engineering technical expert.

Based on his education, experience and extensive career, serving on a variety of different naval ships, including aircraft carriers, battleships, destroyers and auxiliary craft, he has extensive knowledge of the equipment and materials located and used in the machinery spaces of military, including the materials and equipment utilized in the engine rooms of the ship Laughlin worked on board, the USS Conyngham.

Commander Ott is expected to testify consistently with Capt. Lowell's previous reports and deposition testimony in this matter. Commander Ott has extensive experience with the military procurement system and military specifications, and will testify that he is

personally familiar with the function, use and requirements of asbestos-containing materials such as gaskets, packing and insulation with pumps and valves and other equipment. Commander Ott has also worked in and visited numerous shipyards and will testify about the work performed by both naval and shipyard personnel on naval vessels during dry-dock and shipyard overhaul or repair periods. He will further testify about how that work is divided between crewmembers and shipyard workers, and what occurs prior to, during and after overhaul and repair periods. Commander Ott may also testify about the proper functioning, proper maintenance and types of repairs that would be necessary on pumps and valves, boilers, engines/turbine and auxiliary machinery aboard destroyers. He will testify that the gaskets and packing specified, required and used in pumps and valves were asbestos-containing, and that asbestos-containing gaskets, packing and insulation were necessary components of this equipment to function properly. He will discuss Laughlin's work on USS Conyngham and how that work would have subjected him and his crewmates to dust from asbestos gasket and packing work. He may also discuss the availability of non-asbestos substitutes during the relevant period, and the process for specifying and ordering asbestos gaskets and packing as well as asbestos gasket and packing materials from which gaskets and packing were made. He may also testify about the Navy provisioning specifications and how they impacted the characterization and reordering of replacement gaskets and packing and gasket and packing material. He will further discuss the reliance of the Navy on commercial product manufacturers and designers, the fact that the Navy preferred to purchase and write specifications around products that were already in the commercial marketplace.

To the extent such testimony is necessary, Commander Ott will testify that Federal, DOD and Navy specifications and standards permitted or required manufacturers to include warnings about the hazards associated with their products. These warnings were permitted or required on the products and equipment itself, its packaging, its repair parts and their packaging, and in the manufacturers' technical manuals pursuant to the General Specifications for Machinery, the MIL-M-15071 series, the MIL-P-15024 series, the MIL-STD-129 series, the MIL-STD-1341 series, Fed. Std. 313, and the NAVMAT P-5100 series of military specifications, standards and regulations. To the extent necessary, he may also testify consistent with the attached report that procurement specifications stated the Navy's minimum requirements for a product and that manufacturers and suppliers were able to exceed the minimum requirements, including with regard to markings on the face of their products and packages. He may also discuss, consistent with Capt. McCloskey's and Radm Sargent's testimony in this case and in the Mullinex case, that the hazards of asbestos gaskets and packing were not known by the Navy during the relevant period and that the Navy did not have a program of institutional training on the hazards of asbestos gaskets and packing during the relevant period.

(b.) Defendants' Custodians of Corporate Records

Air & Liquid Systems Corporation, Successor by Merger to
Buffalo Pumps, Inc.;
Armstrong International, Inc., Individually and as successor to Armstrong
Machine works

Aurora Pump Company;
BW/IP International, Inc. (f/k/a Byron Jackson Pump Division);
Crane Co.;
Flowserve US, Inc., Individually and as successor in interest to Edward Valves
and Rockwell Edward Valves;
Gardner Denver, Inc.;
Goulds Pumps LLC;
Grinnell LLC;
IMO Industries, Inc., as Successor in Interest to DeLaval Pumps;
Ingersoll-Rand Company
ITT LLC, f/k/a Hammel-Dahl Company, f/k/a General Controls Co.
J. Henry Holland Corporation;
J.R. Clarkson Company LLC, Kunkle Industries, Inc.;
John Crane, Inc.;
Metropolitan Life Insurance Company
Milwaukee Valve Company
Nash Engineering Company;
Noland Company
SB Decking Co., Inc., a/k/a SELBY BATTERSBY;
Spirax Sarco, Inc.
The William Powell Company;
Union Carbide Corporation;
Viking Pump, Inc.;
Waco, Inc.; and
Warren Pumps LLC

(c.) Government Agencies Custodian of Records:

Environmental Protection Agency (EPA)
Occupational Safety and Health Administration (OSHA)
National Institute for Occupational Safety and Health (NIOSH)

(d.) Defendant's Corporate Representatives

Martin Kraft (Air & Liquid Systems Corporation);
William McLean (Crane Co.);
Harry Farley (Crane Co.);
Jim Petersen (Crane Co.);
Anthony Pantaleoni (Crane Co.);
Bruce H. Conner (Goulds Pumps);
Richard Salzmann (IMO Industries, Inc.);
George Springs (John Crane, Inc.);
Roland Doktor (Warren Pumps LLC);
Newport News Shipbuilding & Dry Dock Company Custodians of Record (Jim
Thornton, Industrial Hygienist and Custodian of Records regarding Industrial
Hygiene Records of Newport News Shipbuilding & Dry Dock Company; Bob

Collins, former Custodian of Records of Newport News Shipbuilding & Dry Dock Company, via deposition taken In Re All Newport News Circuit Court Asbestos Cases, October 20, 2005; Carl Coon, Custodian of Records Regarding ship construction, deposed in CP/77-1, Custodian of Records for Medical Records, Wage, and Personnel Records); and Norfolk Naval Shipyard Custodian of Records; and

Any other Corporate Representatives identified by Defendants in this matter.

FIRST SUPPLEMENTAL DISCLOSURE REGARDING DEFENDANT'S CORPORATE REPRESENTATIVES:

Plaintiff's add the following:

(d.) Defendant's Corporate Representatives – Live or by prior deposition

Most knowledgeable person/Corporate Representative (BW/IP International);
Andrew Schiesel (Gardner Denver, Inc.);
James Costigan (SB Decking Co., Inc.);
William Iselin (SB Decking Co., Inc.);
Bernard J. Radle (Spirax Sarco);
James P. Tucker (Flowserve US, Inc.);
Most knowledgeable person/Corporate Representative (Grinnell LLC);
Most knowledgeable person/Corporate Representative (ITT LLC);
Most knowledgeable person/Corporate Representative (J.R. Clarkson Company LLC);
Most knowledgeable person/Corporate Representative (Union Carbide Corporation);
Fred Boness (Milwaukee Valve Company);
Most knowledgeable person/Corporate Representative (The William Powell Company);
Most knowledgeable person/Corporate Representative (Viking Pump, Inc.);
Most knowledgeable person/Corporate Representative (Waco, Inc.);
George McKillop (John Crane, Inc.);
Terrence McNamara (John Crane, Inc.);
David Nash (Nash Engineering) - most knowledgeable person live or by deposition from prior cases, including but not limited to, depositions in *Adams v. A.W. Chesterton, et al.*, Case No. STCV1003924 (Chatham Cnty, Ga. Jun. 22, 2012); *Prough v. Allis Chalmers, et al.*, Case No. BC389423 (Los Angeles Cnty, Ca., Nov. 13, 2008); *Provencher, et al. v. Albert's Hardware, et al.*, Case No. 06-1600 (Middlesex, MA, Dec. 1, 2006); *Baldini, et al. v. Alfa Laval, Inc., et al.*, Case No. 03-5291 (Middlesex, MA, Dec. 1, 2006);

Any other Corporate Representatives identified by Defendants in this matter.

**Portion moved to section (f) Corporate Representatives/Custodian/Officer of other Companies*

(e.) Trade Groups

American Chemistry Council (Dell Perelman and John Connelly)
American Industrial Hygiene Association
Asbestos Information Association (Robert Pigg and Matthew Swetonic -via deposition)
American Society for Testing and Materials
Asbestos Textile Institute (Doris H. Fagan Volpe and John A. Brown, Jr. via deposition)
American Petroleum Institute
Industrial Hygiene Foundation (Lyn Berard-via deposition)
Industrial Health Foundation (Jane F. Brislan, Daniel Braun and David Egilman - via deposition)
Illinois Manufacturers Association
Johns-Manville Document Depository (Maggie Baumgardner)
Mariner's Museum, Custodian of Records
National Safety Council (Robert Marecek, Philip Schmidt -via deposition)
North American Asbestos Co. (Jim Walker, Custodian of Records)

(f.) Corporate Representative/Officers of other Companies

FIRST SUPPLEMENTAL DISCLOSURE REGARDING CORPORATE REPRESENTATIVES/OFFICERS OF OTHER COMPANIES:

(f) Corporate Representative/Custodian/Officers of other Companies

**Moved from section (d) Defendant's Corporate Representatives*

Newport News Shipbuilding & Dry Dock Company Custodians of Record (Jim Thornton, Industrial Hygienist and Custodian of Records regarding Industrial Hygiene Records of Newport News Shipbuilding & Dry Dock Company; Bob Collins, former Custodian of Records of Newport News Shipbuilding & Dry Dock Company, via deposition taken In Re All Newport News Circuit Court Asbestos Cases, October 20, 2005; Carl Coon, Custodian of Records Regarding ship construction, deposed in CP/77-1, Custodian of Records for Medical Records, Wage, and Personnel Records); and Norfolk Naval Shipyard Custodian of Records; and

(g.) Defendants' Expert Witnesses

SECOND SUPPLEMENTAL DISCLOSURE REGARDING WITNESSES COMMON TO JOHNSON AND LAUGHLIN:

- (h.) Other Witness(s)
James E. Heffron
21 Franklin St.
Phelps, NY 14532-1013

Corporate representative for Garlock Sealing Techs. live or by deposition in *Johnson et al., and Laughlin, et al., v. Air & Liquid Systems Corp. et al.*, Case No. 4:18-cv-132-AWA-RJK; *Phillips v. Garlock Sealing Techs. Inc. et al*, No. 2008-41366 (Harris County, Texas, Feb. 17, 2009); *Davis v. ACandS, Inc, et al*, Consol. No. 99001241 (Baltimore City Cir. Ct., MD, Apr. 28, 2000); *Davis v. Garlock, Inc. et al*, Cause No. 2002-28497 (Harris County, Texas Oct. 28, 2003); and *Carroll v. ACandS, et al*, Consol No. 24-X-05-000874 (Baltimore City Cir. Ct., MD, Apr. 4, 2007);

George Crowther
224 Oakland Pl
North Wales, PA 19454-2462

Employee and corporate representative for Greene, Tweed & Co. live or by deposition in this case or in *Flores v. Able Supply Co., et al*, Cause No. 26, 496 (Milan County, Texas, Oct. 14, 2004);
John D. Call (deceased)

Corporate representative for The Anchor Packing Company in 1993, by deposition *In re: Asbestos Personal Injury Cases*, (Jackson County, MS, Jun 25, 1993).

Plaintiffs reserve the right to call any witness identified on Defendants' witness list or further identified during the discovery process. See also Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents at Interrogatory Nos. 12, 13, 37, and 43.

THIRD SUPPLEMENTAL DISCLOSURE OF DOCUMENTS AND MATERIALS
COMMON TO JOHNSON AND LAUGHLIN:

- (f) In addition to the deposition transcripts of James Heffron identified above in Plaintiffs' Second Supplemental Disclosure of Documents and Materials Common to Johnson and Laughlin, Plaintiffs supplement this disclosure to include:

James E. Heffron
21 Franklin St.
Phelps, NY 14532-1013

Corporate representative for Garlock Sealing Techs. live or by deposition in *Johnson et al., and Laughlin, et al., v. Air & Liquid Systems Corp. et al.*, Case No. 4:18-cv-132-AWA-RJK (and any and all exhibits to that deposition, attached hereto, transcript will be equally available to the defense when

completed); *Phillips v. Garlock Sealing Techs. Inc. et al*, No. 2008-41366 (Harris County, Texas, Feb. 17, 2009) (and any and all exhibits to that deposition); *Davis v. ACandS, Inc, et al*, Consol. No. 99001241 (Baltimore City Cir. Ct., MD, Apr. 28, 2000) (and any and all exhibits to that deposition); *Davis v. Garlock, Inc. et al*, Cause No. 2002-28497 (Harris County, Texas Oct. 28, 2003) (and any and all exhibits to that deposition); and *Carroll v. ACandS, et al*, Consol No. 24-X-05-000874 (Baltimore City Cir. Ct., MD, Apr. 4, 2007) (and any and all exhibits to that deposition); *Reynolds v. Amchem Products, Inc., et al*, Index No. 117820 (County of Niagara, State of New York, October 22, 2004)(and any and all exhibits thereto); and *In re: Hawaii State Asbestos Cases*, Civil Action No. 07-1-ACM-002, Volumes I and II (In the Circuit Court of the First Circuit, State of Hawaii, August 21, 2007 and September 12, 2007) (and any and all exhibits thereto).

SEVENTH SUPPLEMENTAL DISCLOSURE OF DOCUMENTS AND MATERIALS
COMMON TO JOHNSON AND LAUGHLIN:

(g) Allen Winer, by deposition taken in *Chapin v. ACANDS, Inc., et al*, Civil Action S79-0271, U.S. District Court for the Southern District of Mississippi, taken January 7, 1982, attached hereto.

John Haas, by deposition taken in: (1) *In Re: Asbestos Cases*, C/P 77-1, United States District Court for the Eastern District of Virginia, Newport News and Norfolk Division, taken October 27, 1982; by deposition taken in *Dorothy St. Jacque, et al., v. Johns-Manville Products Corp., etc., et al.*, Superior Court for the State of California, Los Angeles County, taken September 16, 1980; by deposition taken in *Wedgeworth, et al., v. Armstrong Cork*, US District Court for the Southern District of Mississippi, 5-11-1981. Copies of these transcripts attached hereto.

EIGHTH SUPPLEMENTAL DISCLOSURE OF DOCUMENTS AND MATERIALS
COMMON TO JOHNSON AND LAUGHLIN:

(h) George M. Parker, by deposition taken in *George M. Parker and Peggy A. Parker v. John Crane, Inc., et al*, Civil Action CL14-02913F-15, Circuit Court for the City of Newport News, taken February 12, 2015.

(A)(iii) - A computation of any category of damages claimed by the disclosing party, making available for inspection and copying as under Rule 34, the documents or other evidentiary material, not privileged or protected from disclosure, on which such computation is based, including materials bearing on the nature and extent of injuries suffered:

- a. Patrick A. Laughlin's physical and emotional pain and suffering;
- b. Patrick A. Laughlin's lost wages and lost future earning capacity;
- c. Deborah Laughlin's loss of society and loss of consortium;
- d. Medical expenses and other associated expenses related to the diagnosis and treatment of Mr. Laughlin's mesothelioma. Mr. Laughlin's medical bills, that are

currently in Plaintiffs' possession, currently total \$811,532.78. His treatment is ongoing, and thus his expenses will continue to accumulate. Additional bills will be collected and provided as discovery continues; and

- e. Future funeral expenses.

(A)(iv) - For inspection and copying under Rule 34, any insurance agreement under which an insurance business may be liable to satisfy all or part of a possible judgment in the action or to indemnify or reimburse for payments made to satisfy the judgment.

- a. Not applicable.

DOCUMENTS AND MATERIALS SPECIFIC TO LAUGHLIN

(A)(ii) – A copy of or a description and location of, all documents electronically stored information and intangible things in the possession, custody, or control of that party, which may be used to support the party's claims or defenses, unless the use would be solely for impeachment:

- (a) Plaintiffs' Answers to the Standard Set of Interrogatories and Requests For Production of Documents and all exhibits thereto, including Exhibits 1 through 8 thereto: Employment Chronology of Patrick Laughlin (Exhibit 1), Asbestos Product Sheets (Exhibit 2), Plaintiff's Knowledge of Asbestos (Exhibit 3), Employer Information (Exhibit 4), Product and Equipment Photos Recognized by the Plaintiff, Patrick Laughlin (Exhibit 5), Product and Equipment Photos Reviewed by the Plaintiff, Patrick Laughlin (Exhibit 6), Ship List and Chronology of Duty Stations of Patrick Laughlin (Exhibit 7) and Affidavit of Patrick Laughlin (Exhibit 8), as well as any additional supplemental or amended discovery responses;
- (b) Patrick Laughlin's currently available Medical Records, Bates Numbers 00001-00397, previously provided to the Defendants as Exhibit 9 to Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents. Patrick Laughlin's treatment is ongoing and Plaintiffs reserve the right to supplement and provide additional records as they become available during Patrick Laughlin's medical treatment;
- (c) Patrick Laughlin's currently available Medical Bills, previously provided to the Defendants as Exhibit 10 to Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents. Patrick Laughlin's treatment is ongoing and Plaintiffs reserve the right to supplement and provide additional bills as they become available during Patrick Laughlin's treatment;
- (d) Mr. Laughlin's currently available Military Records received to date, previously provided to the Defendants as Exhibit 11 to Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents and Bates Numbered

as Laughlin, PA_NPRC000001- Laughlin, PA_NPRC000116, and the corrected DD214, also attached as Exhibit 11;

- (e) Patrick Laughlin's currently available Social Security Records, previously provided to the Defendants as Exhibit 12 to Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents;
- (f) Plaintiffs' Tax Returns from 2014 to 2018, previously provided to the Defendants as Exhibit 13 to Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents;
- (g) Releases and Authorizations for obtaining Patrick Laughlin's medical, military, and Social Security Records, previously provided to Medical Liaison Counsel for the Defendants as Exhibit 14 to Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents;
- (h) Patrick Laughlin's Claims for Benefits with the Veteran's Administration, previously provided as Exhibit 15 to Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents;
- (i) Plaintiffs' Marriage Certificate, previously provided as Exhibit 16 to the Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents;
- (j) Ship documents previously provided as Exhibit 17 to the Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents pertaining to the USS Conyngham (DDG-17).
- (k) Consultation report of John C. Maddox, M.D., dated 12/31/2018, previously provided as Exhibit 18 to Plaintiffs' Answers to the Standard Set of Interrogatories and Requests for Production of Documents;
- (l) Pathology materials of Patrick A. Laughlin which are presently available to Plaintiffs, along with all pathology and consultation reports prepared in relation to this pathology;
- (m) Family and Personal Photographs which will be provided in accordance with the pre-trial scheduling Order
- (n) Transcripts of the deposition testimony of Patrick A. Laughlin to be taken in this matter;
- (o) Any muster rolls, departure reports, inspection reports ship logs or other such documents that are discovered or produced in this matter;

- (p) Any and all documents relating to ships, equipment, or other products that are discovered or produced in this matter.

SUPPLEMENTAL DISCLOSURE (A)(ii) DOCUMENTS AND MATERIALS SPECIFIC TO LAUGHLIN

(q) **Plaintiffs' First Supplemental Answers to the Standard Set of Interrogatories and Requests for Production of Documents and all exhibits thereto, including Supplemental Medical Bills (Exhibit 10), Supplemental Ship Documents – Deck Logs (Exhibit 17), and Client Photographs (Exhibit 19)(*previously provided*);.**

(r) **Plaintiffs' Second Supplemental Answers to the Standard Set of Interrogatories and Requests for Production of Documents and all exhibits thereto, including Second Supplemental Ship Documents (Exhibit 17) (*previously provided*);**

(t) **Plaintiffs' Third Supplemental Answers to the Standard Set of Interrogatories and Requests for Production of Documents and all exhibits thereto, including Amended Product Information (Exhibit 2) (*previously provided*);**

(u) **Plaintiffs' Fourth Supplemental Answers to the Standard Set of Interrogatories and Requests for Production of Documents and all exhibits thereto, including Social Security Records (Exhibit 12)(*previously provided*); and**

(v) **Plaintiffs' Fifth Supplemental Answers to the Standard Set of Interrogatories and Requests for Production of Documents and all exhibits thereto, including Supplemental Medical Records (Exhibit 9), Supplemental Medical Bills (Exhibit 10), and Supplemental Ship Documents (Exhibit 17) (*previously provided*).**

OTHER DOCUMENTS AND MATERIALS RELATED TO LAUGHLIN

- (a) Plaintiffs are in possession of documents and exhibits provided by Defendants pursuant to discovery requests in prior cases in the Circuit Court for the City of Newport News, Virginia and in other jurisdictions. Plaintiffs' copies of these documents are presently are stored at the law offices of Patten, Wornom, Hatten & Diamonstein, LC in Newport News, Virginia. Plaintiffs are unaware of the location of the respective Defendants' copies of these documents or the original documents. Plaintiffs will supply an additional copy to Defendants upon request;
- (b) Plaintiffs are in possession of various transcripts of testimony from Defendants' fact and expert witnesses from previous trials including, but not limited to: *Jones v. John Crane, Inc.*, *Oney v. John Crane, Inc.*, *King v. John Crane, Inc.*, *Koonce v. John Crane, Inc.*, *Sanders v. John Crane, Inc.*, *Hardick v. John Crane, Inc.*, *Bristow v. John Crane, Inc.*, *Daniel v. John Crane, Inc.*, *Hill v. John Crane, Inc.*, and *Parker v. John Crane, Inc.*, *Padgett v. John Crane, Inc.*, *Brown v. John Crane, Inc.*, *Mullinex v. John Crane, Inc.*, and *Goodrich v. John Crane, Inc.* Plaintiffs' copies of these transcripts are presently are stored at the law offices of

Patten, Wornom, Hatten & Diamonstein, LC in Newport News, Virginia. Plaintiffs are unaware of the location of the respective Defendants' copies of these transcripts. Plaintiffs will supply an additional copy to Defendants upon request;

- (c) Plaintiffs may rely upon any or all of the exhibits previously identified and produced by plaintiffs represented by PWHd in previous trials, including, but not limited to any of the exhibits identified in the Newport News Circuit Court case, *Parker v. John Crane, Inc., et al.*, Civil Action No. CL14-01913F-15(TF), as well as those previously provided in *Brown v. John Crane, Inc.*, *Mullinex v. John Crane, Inc.*, and *Goodrich v. John Crane, Inc.*:
- i. Plaintiffs' Gasket and Packing Exhibit List (index attached hereto as Exhibit 4);
 - ii. Plaintiffs' Government Exhibit List (index attached hereto as Exhibit 5);
 - iii. Plaintiffs' American Chemistry Council Exhibit List (index attached hereto as Exhibit 6);
 - iv. Plaintiffs American Industrial Hygiene Association Exhibit List (index attached hereto as Exhibit 7)
 - v. Plaintiffs' Asbestos Information Association Exhibit List (index attached hereto as Exhibit 8);
 - vi. Plaintiffs' American Petroleum Institute Exhibit List (index attached hereto as Exhibit 9);
 - vii. Plaintiffs' American Society of Mechanical Engineers Exhibit List (index attached hereto as Exhibit 10);
 - viii. Plaintiffs' Asbestos Textile Institute Exhibit List (index attached hereto as Exhibit 11);
 - ix. Plaintiffs Industrial Hygiene Foundation Exhibit List (index attached hereto as Exhibit 12);
 - x. Plaintiffs' Illinois Manufacturing Association Exhibit List (index attached hereto as Exhibit 13);
 - xi. Plaintiffs' Manville Exhibit List (index attached hereto as Exhibit 14);
 - xii. Plaintiffs' National Safety Council Exhibit List (index attached hereto as Exhibit 15);
 - xiii. Plaintiffs' Air and Liquid (Buffalo Pumps) Exhibit List (index attached hereto as Exhibit 16);
 - xiv. Plaintiffs' Armstrong International, Inc. (Armstrong Machine Works) Exhibit List (index attached hereto as Exhibit 17);
 - xv. Plaintiffs' Aurora Pump Company Exhibit List (index attached hereto as Exhibit 18);
 - xvi. Plaintiffs' BW/IP International, Inc. (f/k/a Byron Jackson Pump Division) Exhibit List (index attached hereto as Exhibit 19);
 - xvii. Plaintiffs' Crane Co. Exhibit List (index attached hereto as Exhibit 20);
 - xviii. Plaintiffs' Flowserve US, Inc., Individually and as successor in interest to Edward Valves and Rockwell Edward Valves Exhibit List (index attached hereto as Exhibit 21);

- xix. Plaintiffs' Gardner Denver, Inc. Exhibit List (index attached hereto as Exhibit 22);
- xx. Plaintiffs' Goulds Pumps Exhibit List (index attached hereto as Exhibit 23);
- xxi. Plaintiffs' Grinnell LLC Exhibit List (index attached hereto as Exhibit 24);
- xxii. Plaintiffs' IMO Industries Exhibit List (index attached hereto as Exhibit 25);
- xxiii. Plaintiffs' Ingersoll-Rand Company Exhibit List (index attached hereto as Exhibit 26);
- xxiv. Plaintiffs' ITT LLC (Hammel-Dahl Company) Exhibit List (index attached hereto as Exhibit 27);
- xxv. Plaintiffs' J. Henry Holland Corporation Exhibit List (index attached hereto as Exhibit 28);
- xxvi. Plaintiffs' J. R. Clarkson Company LLC, Kunkle Industries, Inc. Exhibit List (index attached hereto as Exhibit 29);
- xxvii. Plaintiffs' John Crane, Inc. Exhibit List (index attached hereto as Exhibit 30);
- xxviii. Plaintiffs' Milwaukee Valve Company Exhibit List (index attached hereto as Exhibit 31);
- xxix. Plaintiffs' Noland Company Exhibit List (index attached hereto as Exhibit 32);
- xxx. Plaintiffs' Nash Engineering Company Exhibit List (index attached hereto as Exhibit 33);
- xxxi. Plaintiffs' SB Decking Co., Inc., a/k/a SELBY BATTERSBY Exhibit List (index attached hereto as Exhibit 34);
- xxxii. Plaintiffs' Spirax Sarco, Inc. Exhibit List (index attached hereto as Exhibit 35);
- xxxiii. Plaintiffs' The William Powell Company Exhibit List (index attached hereto as Exhibit 36);
- xxxiv. Plaintiffs' Union Carbide Corporation Exhibit List (index attached hereto as Exhibit 37);
- xxxv. Plaintiffs' Viking Pump, Inc. Exhibit List (index attached hereto as Exhibit 38);
- xxxvi. Plaintiffs' Waco, Inc. Exhibit List (index attached hereto as Exhibit 39);
- xxxvii. Plaintiffs' Warren Pumps LLC Exhibit List (index attached hereto as Exhibit 40);
- xxxviii. Reliance list of Dr. John C. Maddox (index attached hereto as Exhibit 41);
- xxxix. Reliance list of Dr. William Longo (index attached hereto as Exhibit 42);
- xl. Reliance list of Dr. David Rosner (index attached hereto as Exhibit 43);
- xli. Chronology of Dr. David Rosner (attached hereto as Exhibit 44);
- xl. Reliance list of Dr. Terry Spear (index attached hereto as Exhibit 45);
- xl. Reliance list of William A. Lowell (index attached hereto as Exhibit 46);
- xliv. Reliance List of George Neil, Ph.D. (index attached hereto as Exhibit 47);

47); and

- xlvi. Plaintiffs' Medical General and State of the Art Reliance List (index attached hereto as Exhibit 48).

Copies of the indices to these Exhibit Lists are attached as Exhibits 4 through 48. These Exhibit lists and Reliance lists and the corresponding documents have previously been produced to defense counsel repeatedly in prior cases, and the individual exhibits will be produced again upon request. Plaintiffs reserve the right to rely upon any or all of the documents listed on any of these Exhibit and Reliance Lists, as well as the right to supplement or amend any of these Exhibit and Reliance Lists as their investigation and discovery continues or as the Court's Pretrial Scheduling Order permits.

- (d) Plaintiffs may rely upon state of the art scientific and medical notice documents, government publications, publications of trade associations, state and federal laws and regulations, and corporate documents of the Defendants to demonstrate the Defendants had a reason to know and/or actual knowledge of the hazards associated with the breathing of asbestos dust from asbestos-containing products including asbestos-containing gaskets and packing. Plaintiffs' copies of these documents are presently are stored at the law offices of Patten, Wornom, Hatten & Diamonstein, LC in Newport News, Virginia. Plaintiffs are unaware of the location of the respective Defendants' copies of these documents or the original documents. Plaintiffs' counsel has previously produced these documents in prior cases and will supply an additional copy to Defendants upon request;
- (e) Plaintiffs may rely on the testing performed by Dr. William Longo of various asbestos-containing products, including gaskets and packing, which demonstrate the release of respirable asbestos fibers from the intended use of the Defendants' products, including the corresponding videotapes from Dr. Longo's testing and still photograph of his testing. Plaintiffs' copies of these tests are presently are stored at the law offices of Patten, Wornom, Hatten & Diamonstein, LC in Newport News, Virginia. Plaintiffs are unaware of the location of the respective Defendants' copies of these documents. Plaintiffs' counsel has previously provided copies of Dr. Longo's testing and videotapes to Defendants numerous times, and Plaintiffs will provide additional copies of the studies upon request. The studies include those studies listed on the index to Dr. William Longo's Reliance list attached hereto as Exhibit 42. Plaintiffs also reserve the right to rely upon any new testing performed by Dr. Longo, if any, during the course of discovery in this case.

SUPPLEMENT TO DOCUMENTS AND MATERIALS RELATED TO LAUGHLIN

- (f) Letter from JCI to Gov requesting waiver (1-7-82)
- (g) Office of The Assistant Secretary of Defense memo regarding QPLs (5-24-68)
- (h) Letter from Navy Eng. Accepting JCI's recommendation for packing

(11-13-67)

- (i) Memo to McKillop regarding Navy Product Substitution (12-7-84)
- (j) Final Report Non-Asbestos Alternatives for Asbestos Compression Packing and Gaskets (12-79)
- (k) HH-P-46c (May 1966)
- (l) MIL-STD-726B (12-1-65)
- (m) Deposition Transcript of George Springs (11-05-19)
- (n) Deposition Transcript of RADM David P. Sargent (10-22-19)

In addition to the documents previously identified and provided, Plaintiffs' supplement this disclosure with:

- (f) Illustrations of normal anatomy and mesothelioma

Plaintiffs certify that the above disclosures of persons and documents are based on the information now reasonably available to the Plaintiffs. Plaintiffs reserve the right to supplement miscellaneous disclosures or identify additional witnesses or documents in the course of discovery. In addition, Plaintiffs do not waive, and hereby preserve, their objections to witnesses, information, or documents that are protected by the attorney-client privilege or the work product doctrine or that are not sufficiently relevant to justify the burden or expense of production. Plaintiffs reserve the right to supplement or amend these disclosures as additional information is determined by Plaintiffs.

Respectfully submitted,

By: 
Of Counsel

Erin E. Jewell, Esq. (VSB # 71082)
William W.C. Harty, Esq. (VSB # 45447)
Robert R. Hatten, Esq. (VSB # 12854)
Hugh B. McCormick, III, Esq. (VSB # 37513)
Jeannette M. Dodson-O'Connell (VSB# 92206)
Samantha P. Graham, Esq. (VSB# 93529)
PATTEN, WORNOM, HATTEN & DIAMONSTEIN, L.C.
12350 Jefferson Avenue - Suite 300
Newport News, VA 23602
(757) 223-4500 Telephone
(757) 249-3242 Facsimile
ejewell@pwhd.com

pleadings@pwhd.com
Counsel for Plaintiffs

CERTIFICATE OF SERVICE

I hereby certify that on the **11th day of May, 2020**, a true and accurate copy of the foregoing pleading was served by electronic mail (PDF attachment/ShareFile) to the following defense counsel of record:

| | |
|---|------------------------------|
| Eric G. Reeves, Esq. Brian J. Schneider, Esq. Mary Louise Roberts Lisa Moran McMurdo MORAN REEVES & CONN PC 1211 East Cary Street Richmond, VA 23219 | Counsel for John Crane, Inc. |
|---|------------------------------|

By: 
Of Counsel

**Declaration of Andrew A. Ott
in the case of**

Patrick A. Laughlin

I, Andrew A. Ott, do hereby declare under penalty of perjury as follows:

My name is Andrew A. Ott. I have personal knowledge of the statements made below. I am competent in all respects to make this declaration.

- I. **Introduction** – I have been retained by the legal firm of Patten, Wornom, Hatten, Diamonstein to provide my opinions related to Patrick A. Laughlin (hereafter “Laughlin”), and his exposure to asbestos from materials and equipment designed and manufactured by the various companies discussed herein.

A listing of the cases in which I have previously testified and my hourly rate schedule is provided as Exhibit 1.

- A. **Sources** - My findings and opinions related to asbestos materials, including asbestos gasket materials and asbestos packing materials, discussed in this declaration are based upon the following:

1. My personal knowledge, experience and recollections gathered throughout my 24-year Navy career involving the engineering machinery and equipment of steam-powered ships and my work at various naval ship repair facilities, my subsequent 20-year civilian career in maritime engineering practice and management primarily supporting Navy engineering programs, and over ten years’ experience in consulting practice as a marine engineering technical expert. A summary of my background and experience is provided as Exhibit 2 with this report.
2. All of the pleadings, reports, depositions and discovery materials in this case, including all the case-specific materials on my reliance list attached hereto as Exhibit 3.
3. Contemporary documents, technical books and literature, government documents and professional references in the public domain related to the general field of naval engineering, and identified on my List of General Reliance Documents, provided as Exhibit 4.
4. Documents and records specific to the current case, related to the USS Conyngham upon which Mr. Laughlin served, as well as various documents, correspondence, technical manuals for shipboard equipment, associated with or relevant to the various ships or classes of ships at issue, are provided as Exhibit 5.
5. To the extent that additional information, discovery, or documentation provided by others during the process of this case, or any other technical information becomes available, I reserve the right to amend or supplement this declaration.

These documents are typical of those relied upon by marine engineers in forming opinions and inferences on marine engineering matters.

B. Clarifications for the purposes of this declaration:

1. References to “equipment” include all types of materials, machinery, boilers, pumps, valves and similar components associated with the engineering plant, located both within the engineering spaces and distributed throughout the ship, as provided by the defendants.
2. The terms to “supply,” to “manufacture,” to “provide” or to “produce,” and their grammatical variants refer to each and all of the various steps of the product development process, including marketing; engineering design and drawing development; component material selection and acquisition; manufacturing of components; assembly; testing, qualification and certification as required; development and publication of operation, maintenance, repair and overhaul practices and procedures; replacement part cataloging, manufacturing and/or acquisition, warehousing and sales; and providing continuing technical product support throughout the service life of their products, as appropriate in the context of the associated text.
3. The term “overhaul” can be confusing in the context of the Navy’s engineering equipment lifecycle. I will use the term “Regular Overhaul” (ROH) to refer to the formal period of time when a Navy ship enters a shipyard for extensive, in-depth maintenance, repair and in some cases conversion at approximately two- to five-year intervals. I will use the term “overhaul” to refer to the extensive disassembly, repair, reassembly and testing to return a given piece of engineering equipment (such as a boiler, turbine, distilling plant, pump or valve) to “as new” condition and performance.
4. References to the names of various manufacturers are those in effect at the time that each manufacturer provided the product under discussion, and the name typically found on correspondence, equipment drawings, purchase orders, and technical manuals as used at the time, however references to John Crane, Inc and Crane Packing or Crane Packing Co are used interchangeably.
5. References to commercial product suppliers or producers refers inclusively to any and all partners, predecessors and successors in interest, including but not limited to the named entity.
6. General references to suppliers or producers, designers and/or manufacturers of marine engineering equipment, machinery and/or products are intended to refer both collectively and individually to the various defendants, as appropriate in the context of the associated text.
7. I have used shorthand for the titles of various government documents and specifications to enhance readability.
8. All yellow highlighting in figures and graphic illustrations is mine.
9. My statements and opinions provided herein are made to a reasonable degree of engineering certainty. In the even that additional information becomes available, I reserve the right to amend or submit additional findings and conclusions.

II. **Aspects of my background** which are particularly relevant to my opinions in this case are:

- A. From August 1966 through August 1968, I served as a US Navy Electronics Technician (ET). I received extensive maintenance and repair training, including using equipment manufacturers' technical manuals, drawings and material lists; troubleshooting faulty equipment; developing repair processes and documentation; and identifying and acquiring replacement parts.
- B. From August 1968 through June 1972, I received Bachelor and Master of Science degrees under a Navy-sponsored dual-degree engineering program at the Massachusetts Institute of Technology. I then received training on Navy maintenance and repair for engineering plant equipment while at Navy Officer Candidate School (OCS), Newport, Rhode Island.
- C. From July 1972 through March 1973, I received Nuclear Power Training, covering all aspects of steam engineering plant theory and operation. This training also included management of maintenance and repairs of engineering plant equipment.
- D. From October 1973 through March 1977, I served as an engineering officer on the Cruiser USS Bainbridge (DLGN/CGN 25) in various shipboard engineering assignments including that ship's Refueling Overhaul at Puget Sound Naval Shipyard, where I served as Engineering Plant Watch Officer, Engineering Duty Officer, and Plant Overhaul Manager, and Sea Trials Coordinator.
- E. From April 1977 through July 1979, I served at Nuclear Power School, as a Division Director for Reactor Plant theory and operations.
- F. From July 1979 through February 1982, I served as Reactor Controls Assistant on Aircraft Carrier USS Enterprise (CVN 65), including that ship's Regular Overhaul at Puget Sound Naval Shipyard, where I served as Engineering Plant Watch Officer, Reactor Plant Overhaul Manager, and Sea Trials Coordinator.
- G. From February 1982 through April 1984, I served as a senior engineering steam plant inspector on the West Coast Type Commanders' Mobile Training Team.
- H. I attended the Navy's Engineering Duty Officer School's Basic and Advanced courses at Mare Island Naval Shipyard. This training included extensive Navy engineering, maintenance and repair training, including the activities performed within Navy shipyards during the Regular Overhauls of Navy ships as assigned to these Navy shipyards.
- I. From June 1984 through 1987, I served as an engineering plant Ship Superintendent and subsequently as Program Manager at Norfolk Naval Shipyard for the major ROHs of several Navy aircraft carriers and cruisers. These involved the repair, overhaul and testing of major engineering plant equipment and the procurement of repair materials.
- J. At these shipyards I routinely observed both shipyard personnel and ship's crew members perform work on various engineering plant components, including piping, pumps and valves. Shipyard personnel performed major work items associated with the ship's engineering plant equipment, including overhauls of some major equipment. Ship's force personnel performed the routine activities of their ratings, executed repairs and

maintenance as identified by the Ship's Force Work Package, supported shipyard work effort in their spaces by performing Fire Watch duties, and participated in various shipboard painting and preservation projects.

- K. From December 1987 through September 1990, I served as Repair Officer on the Destroyer Tender USS Shenandoah (AD 44), which provided maintenance, repair and equipment overhaul support to numerous other Navy vessels. This Navy Intermediate Maintenance Activity (IMA) consisted of over fifty industrial shops (including Boiler Shop, Pump Shop, Valve Shop, Machine Shop, Electrical Shop, and many others), staffed by about 700 officer and enlisted personnel (including , BTs, MMs, EMs, ICs, MRs, and many other ratings). Shenandoah typically conducted approximately fifty two-week Intermediate Maintenance Availabilities for Navy ships of all types, accomplishing approximately 250-300 work orders during these industrial periods.
- L. After my retirement from the Navy in September 1990, I was employed by a large marine technical services company almost exclusively serving the technical and engineering needs of the Navy, until 2010. As such I continued to be immersed in technical shipboard engineering management and work practices for another twenty years.
- M. I served under contract as a contracted government Contracting Officer's Technical Representative (COTR) for a number of ship industrial periods for the Maritime Administration (MARAD), negotiating and approving specifications and Work Orders, overseeing and accepting such work on behalf of the government. I also led projects with MARAD and the National Oceanic and Atmospheric Administration (NOAA) to generate libraries of standardized specifications for the repair and overhaul of various shipboard engineering plant equipment utilized on their marine fleets.
- N. I served as that company's Program Manager for the engineering and design of a large ocean-going radar ship (T-AGM 25) for use by the government in tracking foreign government missile development activity.
- O. Commencing in the Fall of 2007 and continuing through the present time, I have provided marine engineering technical expertise to various law firms representing both defendants and plaintiffs related to personnel exposure resulting from the maintenance, repair and overhaul of shipboard engineering plant equipment, including asbestos-containing insulation, asbestos-containing gaskets, and asbestos-containing packings. Over the last decade, I have participated in over forty asbestos exposure cases, involving both shipyard and shipboard personnel, involving work performed by both public and private shipyards, involving both plaintiff and defendant clients, and being heard in both federal and state courts.

III. **Opinions with Respect to the Plaintiff's work in the Immediate Vicinity of Airborne Asbestos Fibers**

I have the following opinions with respect to this case which are discussed in greater detail in the following Sections of this report:

- A. That Laughlin was routinely subjected to airborne fibers from asbestos gaskets and asbestos packing on the ships on which he served. Such asbestos-containing gasket materials and packing materials were removed, replaced or otherwise disturbed during maintenance, repairs or overhauls of such machinery and valves, while he served aboard USS Conyngham DDG 17.

- B. That there were three principal mechanisms whereby he was in the immediate vicinity of asbestos fibers and dust within the engineering plants of the various ships upon which they worked. These mechanisms were:
1. When he participated in the routine activities and duties of his trade, related to the equipment associated with the engineering plants, involving asbestos-containing gasket materials and packing materials. This also included times when he participated in routine clean-up efforts of the engineering plant worksites, which regenerated asbestos dust from various sources into the air he breathed;
 2. When they were in the vicinity of work performed by others within their working spaces on equipment containing asbestos, when such asbestos-containing products were worked by others, including ship's force and shipyard personnel; and
 3. When Laughlin was "off duty," involved in the activities of routine daily shipboard life, including berthing, dining, laundering of clothing, training, drills, recreating, and other communal activities typical of Navy life as a result of asbestos fibers and debris that contaminated his work clothing.
- C. That the various suppliers and manufacturers of products at issue in this case possessed the highest level of knowledge of their various technical fields of expertise, and that they continually advanced the state-of-the-art within their fields of expertise.
- D. That, as a result of their expert knowledge and expertise, these manufacturers participated in and collaborated with the Navy to develop purchase specifications for the Navy's acquisition of such products.
- E. That the specifications provided baseline requirements to streamline the contracting process, to level the bidders' "playing field," to reduce ambiguities by using accepted language and terminology, to standardize products across ships and ship types, to simplify the training of operators and maintenance personnel, to apply existing industry standards, to formally incorporate specific commercial practices, to ensure maintainability, reliability, and commonality of testing practices. These baseline specifications did not prevent bidders from exceeding the minimum requirements, stifle innovation, or prevent bidders from supplying additional information to the government.
- F. That equipment manufacturers developed detailed technical manuals containing the specific repair procedures and Lists of Materials for the Navy to manage the lifecycle maintenance and overhauls of the engineering equipment that they supplied. These requirements were known by component part suppliers such as gasket and packing suppliers, and these manuals and materials lists were used by the sailors performing such maintenance and by shipyards performing such overhauls;
- G. That the Navy intended that its machinery and equipment could be safely installed, operated and maintained by junior engineering plant personnel, in part because the Navy expected that manufacturers of hazardous materials would provide safety warnings identifying hazards involved in the use of those materials.
- H. That there was neither reluctance nor prohibition by the Navy for the manufacturers to provide warnings concerning any health hazards of the various materials, including asbestos-containing gaskets and

packings, although such warnings against these hazards were to my knowledge never provided during the period of interest here.

- I. Manufacturers providing products to the government for shipboard use by the Navy were required to provide warnings associated with all hazardous materials that such manufacturers incorporated in the design of their products, if such materials would reasonably be disturbed during the normal use (operation, maintenance, repair, overhaul, and disposal) of such products.
- J. The government requested such warnings on product packaging; on the face of products ultimately issued to the user; and on Material Safety Data Sheets (MSDSs) and other documents they provided to the government.
- K. The government did not interfere with, dissuade from, object to, refuse to, reject or prohibit any manufacturer from providing warnings on any package, within any document, drawing, letter, instruction, or specification. The government did not publish any exception for warnings associated with the health hazard associated with asbestos in any shipboard application, including insulation material, gasket material, or packing material.
- L. The manufacturers, and not the government, by virtue of their performing the engineering, the design, the development of installation, operating, maintenance, and repair procedures, possessed far superior knowledge of the specific details of their equipment and products that would most likely result in the disturbance of asbestos-containing components.

IV. **Marine Engineering Career Patrick Laughlin**

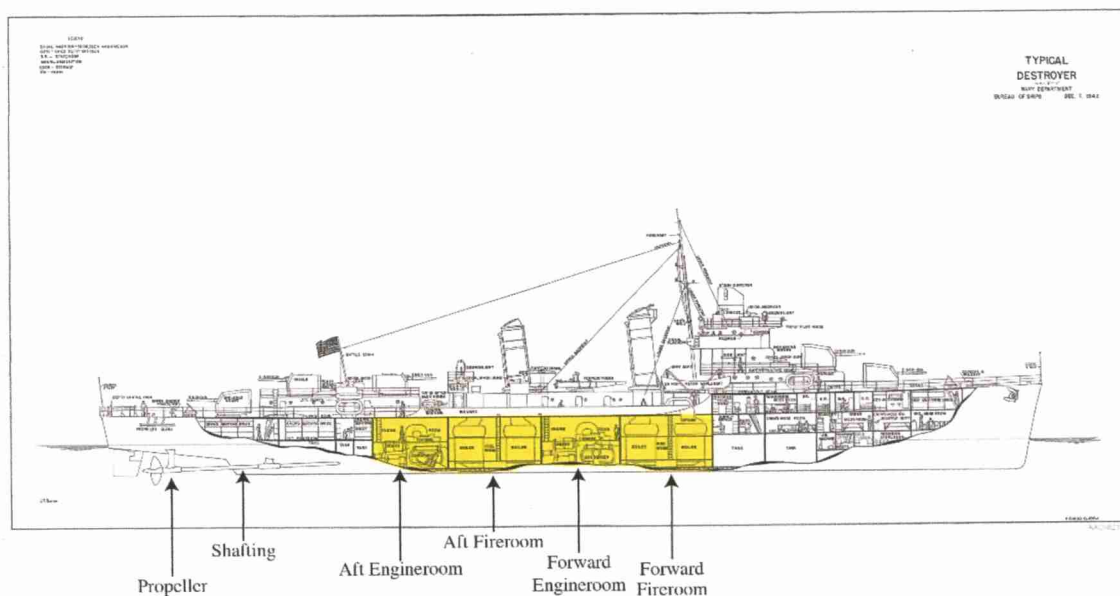
- A. There are a number of factors that support my opinions, including the plaintiff's job responsibilities, his particular work on USS Conyngham as a Machinist's Mate, the level of shipyard and other outside industrial activity undertaken on this ship during his assignment thereto, and the general mechanisms by which asbestos fibers were released from all the defendants' materials, disbursed and ultimately inhaled by Laughlin. Each of these factors is addressed below. I have reviewed the occupational history summary provided for Laughlin presented in Capt. William Lowell's affidavit and report of 10 Sep 2019. I have also reviewed the deposition transcripts of Laughlin and his co-workers, Larry LaLime and Daniel Mannerino and I find no significant inconsistencies with my experience as to the facts of Laughlin's occupational history with regard to the ship on which he served. Furthermore, the occupational history that these witnesses describe, as well as the summary provided in Capt Lowell's expert report describes is consistent with my own understanding and experience as to a career typical for a shipboard Machinist's Mate during the relevant period of time. Laughlin's work history is summarized below.
- B. **Patrick Laughlin's Naval Service Career** - Laughlin's active duty naval career spanned a period of approximately four years, from September 1969 to August 1973. He served the majority of his career as a Machinist's Mate aboard USS Conyngham (DDG 17).
 1. As a Machinist's Mate, Laughlin's job responsibilities primarily involved work associated with the many high-pressure high-temperature systems and equipment within the Aft Engineroom of the Conyngham.

2. Not having attended Machinist's Mate "A" school, Laughlin received on-the-job training, including maintenance and repairs of pumps and valves. This included removing and installing gaskets and packings.
3. Laughlin understood that the gaskets and packings contained asbestos by referring to a Navy chart that was located in the Engineroom, and through on-the-job work and training.
4. Laughlin would use scrapers, hand wire brushes and pneumatic wire brushes to remove gasket materials, and would use corkscrew pullers and other aggressive mechanical devices to remove valve and pump packings, and would blow down the worksite with compressed air during the work he performed on engineering equipment aboard USS Conyngham.
5. Laughlin testified he would use the ball-peen hammer method to make replacement asbestos gaskets from sheet gasket material when pre-cut replacement gaskets were not available.

V. **Mechanisms of Asbestos Exposure** from Shipboard Engineering Plant Materials and Equipment

A. **Marine Engineering Steam Plants** - Marine vessels come in many sizes and shapes, but virtually universally share a common layout as to engineering spaces. The typical arrangement is represented by the following diagram of a typical destroyer-type ship.

1. The yellow highlighted area would generally be considered the engineering spaces, although there are also remote engineering spaces, such as Pump Rooms, Emergency Generator Rooms, and Steering Gear Rooms. For a steam-powered non-nuclear ship such as USS Conyngham, large boilers generate steam, which is used to power the equipment resulting in rotating a large propeller for ship propulsion.



The engineering plant layout (cutaway view) on a typical post-World War II destroyer. This type of ship has two Enginerooms and two Firerooms, each powering a large propeller

2. The boiler steam also powers several large turbine generators for electricity, and also powers equipment for conversion of sea water to fresh water to replenish the boilers and serve the crew's water needs. Steam also provides for cooking and heating.
 3. Regardless of the specific method of a given ship's propulsion, virtually every naval vessel contained extensive fluid systems involving numerous valves, pumps and other equipment associated with these fluid systems. These universal systems included bilge pumping, fresh water cooling and sea water cooling, firemain and related fire-fighting, fuel management, domestic hot and cold water, galley heating and galley water service, sanitary and waste drains, stability and ballast control, compressed air generation and distribution, hydraulic rudder and steering control, and tank liquid control systems. Naval ships, regardless of size or mission, typically contained from hundreds to thousands of valves, and a large number of pumps often numbering into the hundreds to support these systems.
 4. All steam-powered non-nuclear ships utilized high-pressure steam boilers for propulsion power, electrical power generation and fresh water distillation. The most significant of these additional systems were boiler support systems; complex main and auxiliary steam systems; boiler deaerating, preheating and feed systems; main and auxiliary condensate systems, main and auxiliary sea water cooling systems, turbine gland sealing and gland exhaust systems; high-pressure and low pressure drain collection; and distilling plant and distilled water distribution systems. In addition to these systems, there were many minor systems which together operated as an integrated engineering plant. In the case of the larger ships with multiple engineering spaces and multiple boilers, the number of pumps easily exceeded several hundred and the number of valves could reach ten thousand. For each of these systems, every pump and valve expected to operate at temperatures in excess of 125 degrees would likely have had external insulation in the form of removable pads, in addition to internal gaskets at mechanical joints and flanges, and internal packing to seal rotating or sliding mechanical pressure boundaries.
- B. **Boilers** - Below is a simple rendition showing how a marine boiler operates. Fuel Oil creates a fire which boils water, creating the steam.

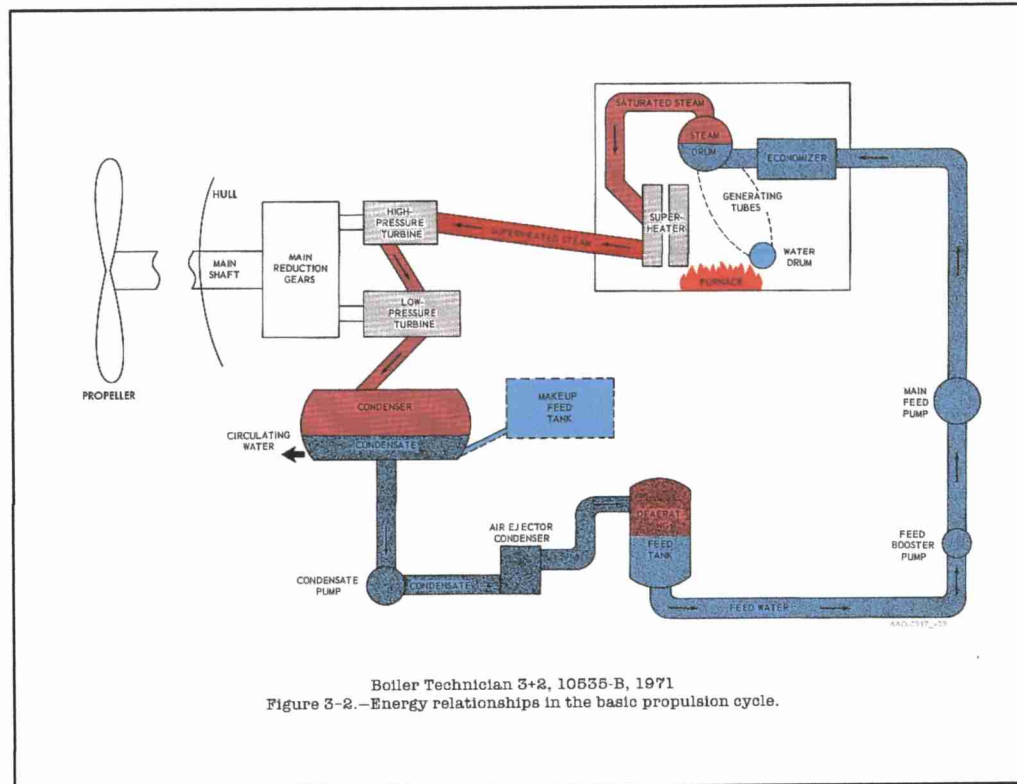


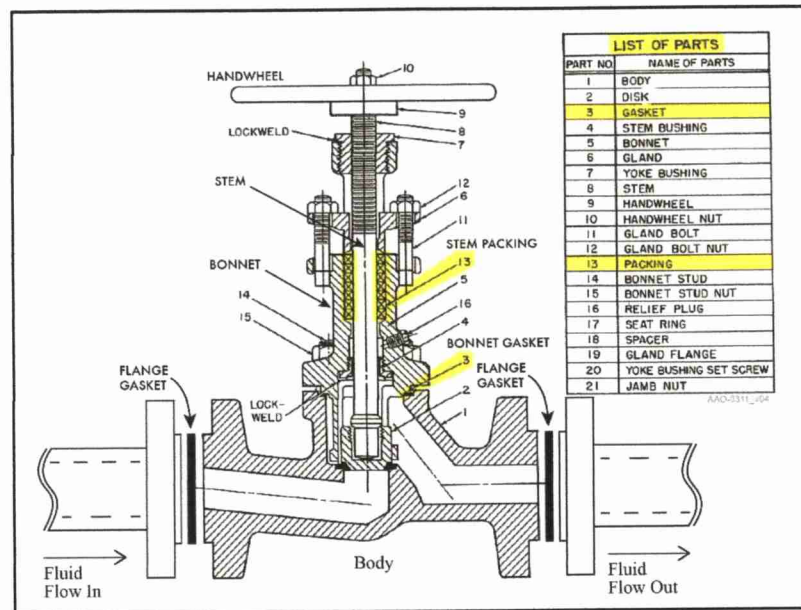
Illustration of a steam boiler cycle, powering a steam turbine consisting of High-pressure (Hp) and Low-pressure (Lp) turbines. The turbines power a large reduction gear (a transmission), which powers a large drive shaft and propeller.

The arrangement above shows a steam valve to control steam flowing to the Steam Turbines. In an actual destroyer of this period, there would likely have been thousands of valves, dozens of pumps and hundreds of feet of piping for steam, fresh water, oil, sea water. The interior of Engineerrooms and Firerooms was very cramped, with very little space for personnel.

C. **Valves** - Valves generally controlled the flow of fluids in piping systems. The illustration below shows the typical components of a valve used in the engineering spaces of a ship. In order to be able to repair the internals of a valve, there was a mechanical joint between the valve body and the valve bonnet. This joint was sealed against leakage by a gasket between the valve body and the valve bonnet. In order to prevent leakage at the valve stem, valve packing was compressed inside the stuffing box using the packing gland, by tightening the gland bolt nuts. In addition, gaskets were installed at the fluid inlet and outlet flanges of these valves.

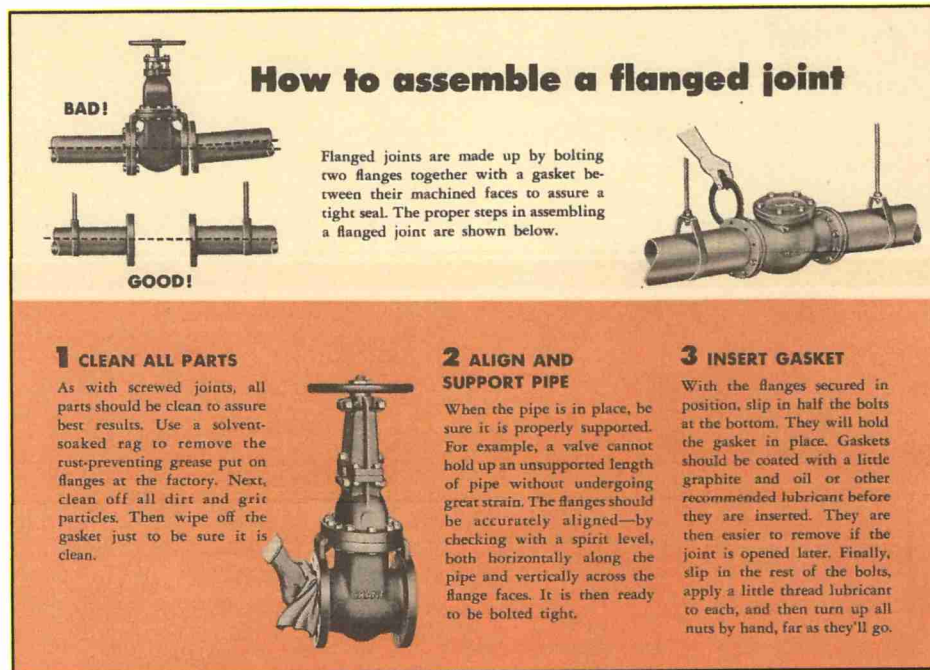
1. Personnel were subjected to asbestos dust and fibers when ship's force or shipyard personnel removed the gasket and the packing, because aggressive/destructive methods were required to remove old gasket material and old packing material. The body-to-bonnet gasket, the flange gaskets and the stem packing were usually manufactured using asbestos-containing materials. This usually required scrapers, cork screw pullers, awls, hardened steel scribes, and other aggressive tools, and wire brushing. Usually after the gasket material or packing material was removed, the work area was blown

down with compressed air, to ensure that the valve was clean and free of remnants and debris from the gasket and packing. This dust and debris became airborne and was inhaled by those in the vicinity.



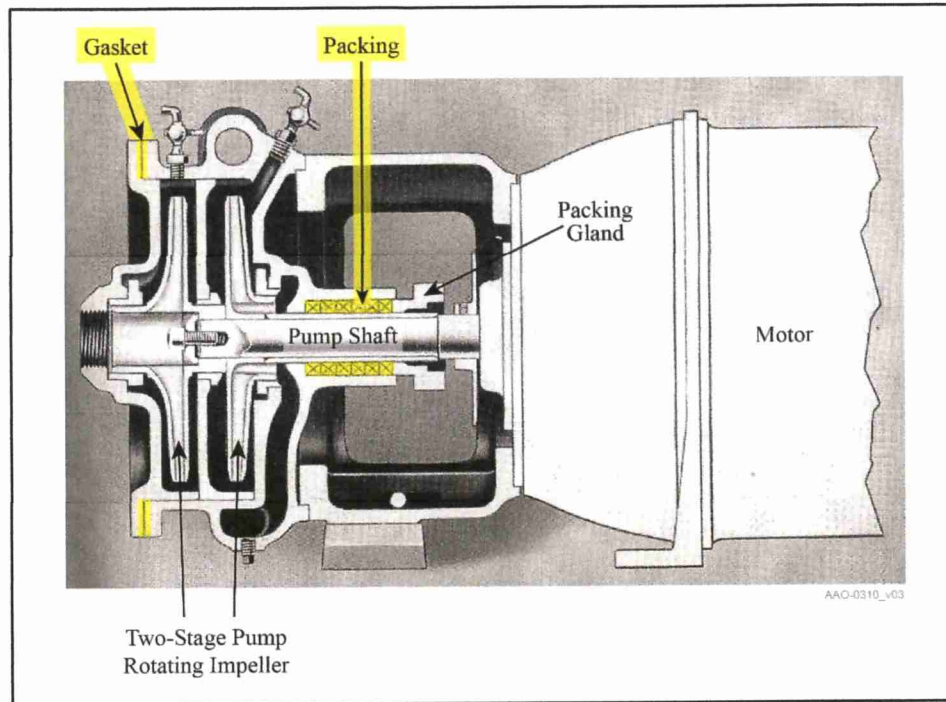
Typical Globe Valve (cutaway view), showing body, bonnet, body-to-bonnet gasket, stem, handwheel, and packing. The stem packing resided within a stuffing tube, and was compressed against the valve stem with the packing gland. The bonnet gasket sealed the flanged joint which was necessary to allow maintenance and repair of the internals of the valve. The flange gaskets sealed the connections between the piping and the valve. (See Fireman, NAVEDTRA 10520-E, 1976, p 132).

2. The above cross-sectional illustration identifies the stem packing, and the bonnet gasket, which were internal components of the valve. The designers of valves based their valve construction on the engineering characteristics of the specific packing and gasket materials as engineered and provided by the gasket and packing manufacturers. Such characteristics typically included compressibility, compression recovery, strength, and other material characteristics. The later substitution of alternate materials during the relevant period of interest would not perform as intended, in terms on immediate leakage, long-term reliability, and the safety of personnel. Adequate non-asbestos materials were not available on the commercial marketplace until the 1980s.
3. As also shown above, most valves were married to adjacent piping or machinery using flanged joints sealed with gaskets. The manufacturers used the same engineering analysis for these flanges and their associated gaskets, based on the physical and mechanical characteristics of the gasket materials selected for these joints as well.
4. Shown below are installation instructions for flange gaskets between valves and their associated piping systems.



Instructions illustrating the proper installation of gaskets in piping systems. (Crane Co, Piping Pointers, 1950, page 91).

- D. **Pumps** - Pumps generally created the flow of liquids within piping systems, in order to move a liquid from one place to another. The illustration below shows the typical components of a pump used in the engineering spaces of a ship. In order to be able to repair the internals of a pump, there is a mechanical joint between that allowed for the separation of the pump to expose its internals. This joint was sealed against leakage by a gasket between the pump components. In order to prevent leakage at the pump shaft, pump packing was compressed inside a stuffing box using the packing gland, by tightening the gland bolt nuts.
1. Workers were subjected to asbestos when ship's force or shipyard personnel removed the gasket or the packing, because aggressive/destructive methods were required to remove old gasket material and old pump packing material. Both the pump body flange gasket and the pump packing were usually manufactured using asbestos-containing materials. This usually required scrapers, cork screw pullers, awls, hardened steel scribes, and other aggressive tools, and wire brushing. Usually after the gasket material or pump packing material was removed, the work area was blown down with compressed air, to ensure that the pump was clean and free of remnants and debris from the gasket and packing. This dust and debris became airborne and was inhaled by those personnel in the vicinity.



Two-stage Centrifugal Pump (cutaway view), Showing Electric Motor, Pump Shaft, Packing, Impeller, and Pump Casing Gasket. The packing resided within a stuffing tube, and was compressed against the valve stem with the packing gland.

VI. **Dispersion of Asbestos from Equipment** - The general mechanisms by which asbestos dust was introduced, dispersed through the working environment, and ultimately inhaled are as follows:

A. Asbestos materials were present on the ships.

1. Asbestos materials were used for three separate purposes: thermal insulation, mechanical sealing of static joints using asbestos-containing gasket materials, and mechanical sealing of moving joints using asbestos-containing packing materials.
2. The presence of asbestos materials was extensive, including thermal insulation block and brick, permanent thermal insulation and removable insulation pads, mechanical sheet and spiral-wound gaskets, and valve packing at the shafts and stems of a very large number of pumps and valves.
3. Around the mid- to late-1970's, the Navy directed that no asbestos was to be used in thermal insulation products installed on ships. However, this directive did not apply to asbestos gaskets and asbestos packing which were utilized up until at least the 1990s. By 1970, the Navy instituted NAVMAT P-5100, Safety Precaution for Shore Activities, which prescribed protective measures for the use of asbestos thermal insulation. This directive also did not apply to asbestos gaskets and packing, the hazards of which were apparently not fully appreciated by the Navy until at least the late 1970s or early 1980s.

- B. Actions that disturbed asbestos-containing materials, including gasket materials and packing materials, were inherently required by the normal and foreseeable use and characteristics of these materials, because the gaskets and packings were designed to adhere tightly to joints to prevent leakage.
1. Manufacturers' equipment required the rapid, reliable lifecycle maintenance of their equipment by both ships force and shipyard personnel during their service life.
 2. Gaskets and packing manufacturers knew that such maintenance disturbed asbestos gaskets and asbestos packing during the performance of maintenance, repair and overhaul procedures.
 3. Pump and valve packing and gaskets were disposable, one-use, wear items that had to be removed and replaced whenever equipment was opened for routine maintenance.
 4. The use of compressed air during disassembly and cleaning of shipboard machinery and valves was expected and allowed. I have encountered no case where the use of compressed air was discouraged or prohibited, nor have I noted any respiratory health warnings associated with its use.
- C. Gasket and packing manufacturers knew that the scraping, brushing, and abrading of asbestos gaskets and packing during maintenance, repair and overhaul of marine steam plant machinery and valves was a normal, planned function for naval shipboard equipment of naval shipyards.
1. Ships force performed normal, programmed maintenance and repairs, as well as emergency repairs, on the ship's equipment as a regular part of the equipment's normal use and operation.
 2. Naval shipyards accomplished necessary boiler, machinery and valve maintenance, repairs and overhauls that were beyond the capacity or the capability of the ship's own crew.
 3. Every Regular Overhaul for each of the vessels listed would have involved the removal, repair, overhaul, reinstallation and testing of valves, pumps and other equipment associated with the fluid systems found aboard virtually every naval vessel.
 4. Such overhauls, repairs and maintenance required the removal and replacement of asbestos gaskets and packing from the machinery and valves.
- D. Most, if not all, units of major engineering machinery and equipment were routinely overhauled and repaired during shipyard overhaul periods.
1. The typical practice of the Navy's ship industrial maintenance planning and performance infrastructure was to service most if not all major units of engineering machinery and valves during each regularly scheduled overhaul. During the latter portion of this period, this practice was articulated and implemented in part through the Navy's Preventative Maintenance System, which was based on the repair and overhaul requirements derived from the various manufacturers' technical manuals, integrating all such requirements into a single comprehensive "policy and practice" process management program.
 2. Such industrial work was typically planned for, budgeted and scheduled significantly in advance of each overhaul, to allow for the identification, ordering, receipt and staging of the necessary parts and

materials, and only modified subsequently if necessary for specific circumstances to address unusual repairs or concerns identified by the ship or by external inspections such as the Navy's Board of Inspection and Survey (INSURV).

3. Regular overhauls (ROHs) were typically planned and scheduled to support the Navy's long-range ship deployment schedule. It is reasonable to consider that most if not all major pieces of engineering equipment on each ship were overhauled during each such ROH. Typical shipyard work packages ideally involved the overhauls of virtually the entire suite of propulsion plant machinery, equipment and valves associated with the engineering plants, including turbines and reduction gear for propulsion and electrical power generation, main steam and auxiliary steam systems, condensate systems, feed systems, Hp and Lp drains systems, lube oil systems, compressed air systems, air conditioning and refrigeration systems, and other engineering systems. I specifically recall most if not all the rotating machinery, and a very large percentage of valves and associated equipment were overhauled during major overhauls in which I participated as an engineering plant manager, for USS Bainbridge and USS Enterprise.
 4. Such work involved extensive on-board flange gasket removals, pump and valve gasket removals, and the removal and replacement of pump shaft and valve stem packings.
- E. Laughlin served as a Machinist's Mate for a long enough period of time for every type of maintenance, repair and overhaul activity and task associated with the myriad mechanical and engineering equipment located on board to be performed, whether by ship's force or shipyard personnel.
- F. The pattern and practice for ventilating machinery spaces during ship overhauls involved deactivating existing ventilation systems for maintenance, and substituting ad-hoc blowers and fans with much less capacity and effectiveness.
1. Dust settled on the bodies and clothing of the workers involved.
 2. Therefore sailors like Laughlin who worked on and around engineering steam plant equipment during its installation, maintenance, repair and overhaul would have been subjected to asbestos dust from gaskets and packing on his clothing for period longer than just the period of his actual work.
- G. During my naval career, serving on two ships during their Regular Overhauls at Puget Sound Naval Shipyard, and then serving as an engineering production manager during the regular Overhauls of several aircraft carriers and cruisers, I observed both ships force personnel and shipyard workers disassembling pumps, valves and other engineering plant equipment. This work involved aggressive methods such as scraping and wirebrushing of gaskets and gasket flange surfaces, and the use of awls, packing pullers, wire brushes for removing packing materials from pump and valve stuffing boxes. This work created visible dust and debris, especially when using compressed air to clean off the pump and valve flanges, and clean out the stuffing boxes of pump and valves.

VII Asbestos as an Engineering Plant Material

- A. **Background** - Asbestos is a naturally-occurring mineral, mined from the ground, just as were coal, iron, copper, and most other natural resources used by industry.
1. The essential characteristic of asbestos as to its use in Navy and commercial ships was that it is a thin needle-like fibrous (stringy) material with good heat resistance. Asbestos was used in marine

engineering applications because it had great mechanical strength with great mechanical flexibility, and was a good thermal insulator. Adding it to a product generally strengthened the product to become a physically enduring mechanical material. All forms of asbestos are silicates (Si_xO_y). A silicate is a chemical “building block” of molecules that contains silicon and oxygen. Each type of asbestos also contains various quantities of iron (Fe), magnesium (Mg) sodium (Na) and calcium (Ca). More specifically, asbestos is a family of similar minerals. All forms are dangerous to health.

2. For Navy applications, asbestos always was mixed with other substances to create a material for a specific application. A “**compound**” exists when two or more chemicals are combined *with* a resulting chemical reaction, resulting in a new compound. An example would be combining an acid with a base. A “**mixture**” exists when two or more chemicals are combined *without* a resulting chemical reaction, meaning that the original components of the mixture still exist unchanged. An example would be mixing salt with pepper. Asbestos appears only in mixture form when it appears in Navy shipboard engineering plants.
3. The marine engineering relevance of the “solid mixture” concept here is that for virtually all asbestos-containing materials used in marine engineering plants, the asbestos fibers are contained within a solid mixture with other substances. Although contained within the solid mixture, the asbestos physically remains in its original form. Therefore, whenever the solid mixture is later disturbed, by sawing, grinding, breaking, crushing or any other aggressive method, the asbestos can be dislodged unaltered from the mixture into the air as fiber and dust, resulting in the release of asbestos fibers in the proximity to personnel.
4. It is noteworthy that the Navy’s own descriptions for asbestos products recognized that asbestos (the hazardous material) was combined with (but has not chemically reacted with) other non-hazardous materials – in other words, becoming a mixture of a hazardous material (asbestos) with another substance, to become a useful material for shipboard use.

B. **Opinions with Respect to Asbestos-Containing Materials**

1. With respect to asbestos-containing insulation materials and products:
 - a. The thermal insulation applied to piping within marine engineering steam plants was categorized as either “permanent insulation” or as “removable pads, covers, or blankets.” Once installed by the constructing shipyard, permanent insulation was expected to remain in place through the service life of the vessel, unless either removed during the performance of ship alterations or during repairs due to damage. On the other hand, removable pads, covers, and blankets were intended to be routinely and periodically removed as necessary during the performance of maintenance, repairs and overhauls and then reinstalled during the service life of the ship.
 - b. Permanent insulation was well-encapsulated with asbestos cloth or canvas lagging, and thoroughly painted. The lagging and painting served to effectively encapsulate permanent insulation throughout the service life of the ship.
 - c. Thus permanent thermal insulation was DESIGNED NEVER TO BE DISTURBED throughout the service life of the ship.

- d. Unless a particular section of permanent insulation were to be disturbed, either as a result of a piping or equipment alteration (most typically conducted by a shipyard), or as a result of damage incurred through some accidental occurrence, permanent thermal insulation was well-encapsulated and seldom if ever disturbed. Regardless of volume, weight, length or quantity of permanent installation on a given ship, the crew and shipyard personnel were not subjected to significant dust from installed permanent thermal insulation.

2. With respect to asbestos-containing gaskets and gasket materials:

- a. Neither the Navy nor any other government activity would have prohibited, interfered with, or prevented any manufacturer or provider of any hazardous asbestos-containing gaskets and gasket materials, from providing appropriate warnings of such hazards to the crew members, shipyard workers or other technicians likely to disturb such materials during their normal performance of the installation, operation, maintenance, repair, overhaul, or disposal of such materials.
- b. The gaskets and gasket materials that manufacturers provided to the government were similar if not identical in appearance, form and function to the same, off-the-shelf products they provided to commercial industry. The government seldom sought or purchased unique engineering plant materials unless under exceptional circumstances, which were infrequent with regard to engineering plant gaskets and gasket materials.
- c. Machinery utilized in marine engineering plants was intended for use throughout the service life of the vessel on which it was installed. In order to achieve such longevity, such equipment needed to be both reliable and maintainable. Sea-going vessels required that the crew could maintain and repair such equipment in an inherently hostile environment. Such maintainability required that equipment be able to be disassembled for both preventative maintenance and corrective repairs. Equipment designs enabled such disassembly, repair and reassembly through the use of mechanical separation flanges at fixed joints. In order to ensure that such joints were leak-tight against the fluid pressures and temperatures at which the equipment operated, gaskets were sandwiched and compressed between the faces of such flanges. Such gaskets were intended and designed to adhere to the flange faces (to prevent leakage), yet to be removable using aggressive techniques such as scrapers, wire brushes and other aggressive methods during the servicing of the equipment. Thus gaskets were DESIGNED TO BE PERIODICALLY DISTURBED during the normal service life of the equipment into which they had been installed.

3. With respect to asbestos-containing packings and packing materials:

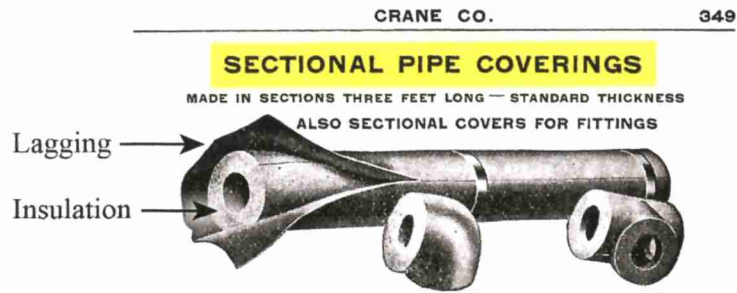
- a. Neither the Navy nor any other government activity would have prohibited, interfered with, or prevented any manufacturer or provider of any hazardous asbestos-containing packings and packing materials, from providing appropriate warnings of such hazards to the crew members, shipyard workers or other technicians likely to disturb such materials during their normal performance of the installation, operation, maintenance, repair, overhaul, or disposal of such materials.
- b. Bulk packing materials and packing rings that manufacturers of such products provided to the Navy were similar if not identical in appearance, form and function to the same, off-the-shelf products

they provided to commercial industry. The government seldom sought or purchased unique engineering plant materials unless under exceptional circumstances, which were infrequent with regard to engineering plant packings and packing materials.

- c. Machinery utilized in marine engineering plants was intended for use throughout the service life of the vessel on which it was installed. In order to achieve such longevity, such equipment needed to be both reliable and maintainable. Sea-going vessels required that the crew could maintain and repair such equipment in an inherently hostile environment. Such maintainability required that equipment be able to be disassembled for both preventative maintenance and corrective repairs. Equipment designs enabled such disassembly, repair and reassembly through the use of packing glands at rotating valve stems and pump shafts. In order to ensure that such packing glands were leak-tight against the fluid pressures and temperatures at which the equipment operated, packings – basically rope-like material wrapped around the shaft - were compressed into the packing glands. Such packings were intended and designed to fit tightly within the packing gland (to prevent leakage), yet to be removable using aggressive techniques such as screw-type packing pullers, wire brushes and other aggressive methods during the servicing of the equipment. Thus packings were DESIGNED TO BE PERIODICALLY DISTURBED during the normal service life of the equipment into which they had been installed.

C. **Thermal Insulation Materials –**

1. Background - By the early years of the twentieth century, several varieties of thermal insulation had been developed by commercial industry, each type involving asbestos within a mixture of other materials. The following catalog page summaries the available thermal insulation materials.



| Inside Diameter of Pipe Inches | Price Per Lineal Foot | Elbows Each | Tees Each | Crosses Each | Globe Valves Each |
|--------------------------------|-----------------------|-------------|-----------|--------------|-------------------|
| 1/2 | .22 | .30 | .36 | .48 | .54 |
| 3/4 | .24 | .30 | .36 | .48 | .54 |
| 1 | .27 | .30 | .36 | .48 | .54 |
| 1 1/4 | .30 | .30 | .36 | .48 | .54 |
| 1 1/2 | .33 | .30 | .36 | .48 | .54 |
| 2 | .36 | .36 | .42 | .54 | .60 |
| 2 1/2 | .40 | .42 | .48 | .60 | .78 |
| 3 | .45 | .48 | .54 | .70 | .96 |
| 3 1/2 | .50 | .54 | .60 | .80 | 1.20 |
| 4 | .60 | .60 | .75 | .95 | 1.50 |
| 4 1/2 | .65 | .72 | .90 | 1.10 | 1.85 |
| 5 | .70 | .90 | 1.20 | 1.50 | 2.25 |
| 6 | .80 | 1.30 | 1.60 | 2.00 | 2.80 |
| 7 | 1.00 | 1.80 | 2.20 | 2.80 | 3.60 |
| 8 | 1.10 | 2.40 | 3.00 | 3.60 | 4.40 |
| 9 | 1.20 | 3.00 | 3.80 | 4.40 | 5.30 |
| 10 | 1.30 | 3.60 | 4.60 | 5.20 | 6.20 |
| 12 | 1.85 | | | | |

The following kinds of Sectional Coverings will be furnished from the above Uniform list prices but at different discounts.

"85 per cent. Magnesite" for high pressure work.

"Imperial Felted" Asbestos, for high pressure work.

Moulded Asbestos, for ordinary service.

Asbestos Air Cell, 1/2, 3/4 and 1 inch thick for ordinary service.

Wool Felt, 1/2, 3/4 and 1 inch thick for Low Pressure and Exhaust Steam; Hot and Cold water pipes.

Inquiries for discounts and orders, should state style, sizes and quantities of covering wanted.

MAGNESIA AND ASBESTOS BLOCK AND SHEET COVERING, furnished in varying sizes and up to four inches thick. Prices quoted according to size, quantity and thickness wanted.

CEMENT IN BAGS. PRICES ON APPLICATION

"85 per cent. Magnesite": Approximate weight per bag 60 pounds.

Asbestos Cement: Approximate weight per bag 100 pounds.

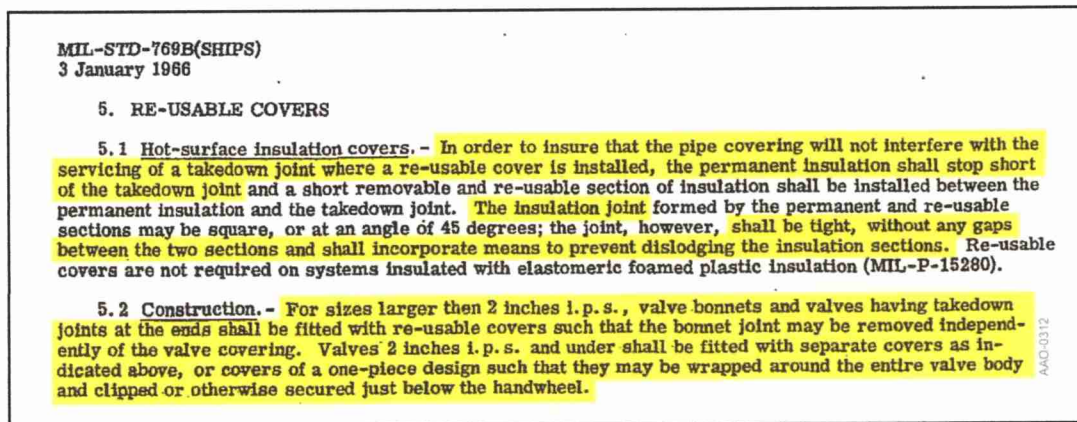
One bag of either will cover approximately 40 square feet of surface one inch thick.

AAO-0300

Thermal Insulation materials, showing several types of pipe covering, all containing asbestos. (Crane Co, Catalog No 40, 1915, page 349).

- a. John Crane, Inc offered asbestos thermal insulation in its 1931 catalog. By the World War II era, the Navy had identified a series of commercial products that provided adequate thermal insulation for the large number of ships required for war service. There were several types of thermal insulation in use, primarily depending on the highest expected operating temperatures of the piping or equipment to which the insulation would be applied. BuShips Manual Chapter 39, *Thermal Insulation*, provided a concise description of these insulation materials (see for example, Ch 39, Part 2, *Materials*, paras 39-11 through 39-13, 1959).
2. Thermal Insulation Requirements - For each ship, or class of ships being constructed, contractual documents described the specific types, thicknesses and techniques selected for use.

- a. Generally, the shipyard constructing the ship was responsible for the acquisition and application of these thermal insulation products. Regardless of the type of thermal insulation used, such insulation was typically covered with lagging, which served to encase, encapsulate and protect the insulation. The catalog page above illustrates the typical installation, where lagging was used to protect and encase the insulation.
 - b. The principal documents directing the processes and materials to be used for insulation and lagging of Navy ships were *General Specifications for Building Vessels of the US Navy*, Section S-39-2 and its succeeding versions, and MIL-STD-769-series, *Thermal Insulation Requirements for Machinery and Piping*, which detailed the requirements for insulating machinery and piping. These documents contained tables for the types and thicknesses to be used for various diameters and operating temperatures of piping and equipment, and incorporated references to the government specifications for each of the various insulation and lagging products to be used. Similar information for shipboard use appeared in the Bureau of Ships (BuShips) Technical manual, Chapter 39, *Thermal Insulation*.
3. Permanent versus Removable Thermal Insulation - Regardless of the specific types and thicknesses of thermal insulation that were selected for a given ship construction project based on the requirements of GenSpecs S-39-2, and MIL-STD-769, and after appropriate system pressure testing had been completed, insulation was applied to piping systems and equipment.
- a. There were two very different approaches to the installation of thermal insulation, depending on whether such insulation was intended to be “permanent insulation” (intended to remain in place without disruption through the service life of the ship), or “removable insulation pads, covers and blankets” (intended to be periodically and routinely removed for the performance of maintenance and repairs, and then reinstalled). MIL-STD-769 articulated this general “permanent/removable” distinction.



These paragraphs from MIL-STD-769B, *Thermal Insulation Requirements for Machinery and Piping*, describe that insulation applied on piping and equipment within Navy engineering plants involved two separate regimes - permanent insulation on piping, and removable pads, covers and blankets in way of flanges, valves and equipment maintenance access points, and interferences therewith.

- b. Using the specific requirements from GenSpecs, MIL-STD-769, and the specific Military Specifications for the various thermal insulation materials selected for use, the Navy (almost exclusively through its Design Agent) developed detailed design drawings for the thermal insulation for engineering plant piping and equipment, which included the types, quantities and techniques to be used by the shipyard for installing the insulation.
 - c. The insulation drawings typically consisted in an initial drawing listing all the equipment and piping systems, usually named "Insulation and Lagging Schedule – Engineering Piping" or similar, containing "General Notes" and "Instructions for Insulation and Lagging." This drawing was followed by a series of subordinate drawings that addressed the insulation and lagging details for specific types of equipment.
 - d. It is indeed fortunate that many of the drawings for the engineering plants of Navy ships of the period of interest are still available at the National Archives. I have located and examined many such insulation and lagging plans, including several directly useful for the case at hand. These drawings now exist as microfilm only (I have been unable to locate the original drawings from which the microfilms were captured). Many of these drawings are quite large, with the text both small and faint. There is therefore no practical way to present these drawings for total view in a report such as this, so I will endeavor here to articulate my major points and opinions using enlarged excerpts taken from these drawings.
4. An Example – Fletcher-class Destroyers - I present below several excerpts of these drawings, for the Fletcher-class destroyers; the Sumner-class and Gearing-class destroyers were quite similar. These destroyers were likely the most common naval vessels during the period of interest here. Hence, taken together, these drawings represent the insulation and lagging plans for about 330 ships, and they were quite typical of the insulation and lagging practices used on all steam-powered Navy ships for the period of interest. I will utilize the set of Insulation and Lagging drawings for the Fletcher-class destroyers (BuShips Drawing DD445-3902-series), as a basis for several conclusions that follow, beginning with the first of this series.
- a. The figure below shows the lower right corner area of this large drawing. It shows the name, pedigree, and applicability of the drawing. Most drawings the associated with Navy engineering plants are similar, and were developed under the requirements of General Specification – Appendix 9, *Preparing Plans and Booklets for Vessels of the United States Navy*; DOD-STD-100/1000-series, Engineering Drawings and Associated Lists, and MIL-D-963-series, *Hull, Mechanical and Electrical Drawings for Naval Shipboard Use*.
 - b. This drawing contained a very large amount of detailed information, much more than could be shown in a single illustration here (but see *BuShips DD445 - Insulation and Lagging Drawings* provided with my General Reliance Documents). This drawing included an "Information and Approvals" block (for use by designers and planners in finalizing the detailed design), a consolidated "List of Materials and Quantities for One Ship" (for use by shipyard supply personnel ordering and storing the materials), and an extensive table naming each of the 18 piping systems within the engineering plant that required thermal insulation, showing the pipe diameters, lengths, and other technical details (for use by the shipyard craftsmen applying the insulation materials). This portion of the drawing also contained a listing of the major engineering equipment ("Boilers, Machinery, and Misc Equipment") that required thermal insulation (i.e. operated typically above 125°F), with a

reference to additional drawings within the accompanying sequence of individual equipment drawing references.

Previous but current
approvals

Previous ships for
which this drawing
was approved

Most recent approval

The design agent who
prepared this drawing

Design agent's
drawing number

Design agent's
reviews

Navy approval

Drawing name

Navy drawing number

| | | | |
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| DD445-54 | | BOSTON NAVY YARD | |
| DD445-55 | | CHARLESTON NAVY YARD | |
| DD445-56 | | PUGET SOUND NAVY YARD | |
| DD445-57 | | CHARLESTON NAVY YARD | |
| DD445-58 | | BOSTON NAVY YARD | |
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- c. This listing of "Boilers, Machinery and Equipment" is reproduced below. The list included 32 different units or types of equipment that were to be insulated. These drawings are included as "Reference Plans" in the lower portion of the excerpt. The middle portion of the excerpt shows "General Notes." General Note #1 states that "INSULATION AND LAGGING SHALL BE READILY REMOVABLE AND REPLACEABLE FOR SERVICE, MAINTENANCE AND REPAIR OF EQUIPMENT WITHOUT DESTRUCTION OF SUCH COVERING." This statement executed the concept of "permanent/removable..." insulation.

| BOILERS, MACHINERY AND MISC EQUIPMENT | | | | | |
|---------------------------------------|--|--------------------|-----------|------------------|-----------|
| UNIT NO | UNIT | INSULATION | | LAGGING | |
| | | MATERIAL | THICKNESS | MATERIAL | THICKNESS |
| 140 | MAIN BOILER STEAM DRUMS | AMOR ASBESTOS FELT | 2" | SHEET STEEL GALV | 0.031" |
| 141 | WATER DRUMS AND HEADERS | AMOR ASBESTOS FELT | 1" - 3" | SHEET STEEL GALV | 0.031" |
| 142 | GENERATING FEED TANKS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 143 | FUEL OIL HEATERS | AMOR ASBESTOS FELT | 2" | SHEET STEEL GALV | 0.031" |
| 144 | AIR EJECTORS (MAIN AUX DIST) | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 145 | CONDENSATE COOLER (DIST PLANT) | HAIR FELT | 1" | CANVAS | 480 OZ |
| 146 | FORCED DRAFT BLOWERS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 147 | H.P. AIR COMPRESSOR | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 148 | L.P. TURBINES AND CROSS OVER PIPES | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 149 | H.P. TURBINES | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 200 | CRUISING TURBINES | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 201 | TURBO GENERATORS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 202 | DISTILLING EVAPORATORS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 203 | DISTILLING AIR EJECTOR CONDENSERS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 204 | H.B. DRAIN TRAPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 205 | CRANKCASE/STEAM DRAIN PIPES/HEATER DRAIN | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 206 | GRAINERS (DISTILLING PLANT) | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 207 | WHISTLE STEAM SEPARATOR | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 208 | WATER SEAL (FUEL OIL HEATERS) | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 209 | EXHAUST SILencers (DIESEL GEN EXHAUST) | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 210 | FLAME CHAMBER (DISTILLING PLANT) | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 211 | FIRE & BILGE PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 212 | EMERGENCY FEED PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 213 | MAIN FEED PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 214 | L.O. SERVICE PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 215 | F.O. SERVICE PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 216 | F.O. BOOSTER PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 217 | WATER CONDENSATE PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 218 | MAIN FEED BOOSTER PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 219 | AUXILIARY FEED BOOSTER PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 220 | MAIN CONDENSER CIRCULATING PUMPS | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
| 221 | PAINT TANK (DIESEL GEN EXHAUST) | AMOR ASBESTOS FELT | 2" | ASBESTOS CLOTH | 0.031" |
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GENERAL NOTES

- INSULATION AND LAGGING SHALL BE READILY REMOVABLE AND REPLACEABLE FOR SERVICE MAINTENANCE AND REPAIR OF ALL INSULATED EQUIPMENT WITHOUT DESTRUCTION OF SUCH COVERING.
- ALL STEAM, EXHAUST, HOT WATER AND FUEL OIL PIPING SHALL BE INSULATED WITH HEAT INSULATING MATERIAL AS SPECIFIED ON THIS PLAN FOR THEIR RESPECTIVE SERVICES.
- WHERE SPECIFIED, ALL COLD WATER PIPES ABOVE FLOOR LEVELS ONLY SHALL BE COVERED IN ACCORDANCE WITH NOTE #10.
- REFRIGERATION PIPES SHALL BE INSULATED IN ACCORDANCE WITH INSTRUCTIONS 5A.
- PRIOR TO INSULATING ALL EXTERNAL SURFACES OF UNSANITIZED FERROUS METAL PIPES, FITTINGS AND VALVES SHALL AFTER CLEANING BE GIVEN TWO (2) COATS OF PRIMER RESISTING ALUMINUM PAINT NO. 6 SPEC. 58-1 IN ACCORDANCE WITH GEN SPEC. 5-10-1.
- BLACK SHEET STEEL LAGGING 1/4" THICK SHALL BE FITTED OVER CLOTH LAGGING ONLY WHERE REQUIRED FOR THE PROTECTION OF INSULATION FROM DAMAGE SUCH AS GLAND LEAKAGES OR ABRASIONS. ALL STEAM LINES AND STEAM MANIFOLDS LOCATED DIRECTLY UNDER L.B. & FUEL OIL SERVICE LINES SHALL HAVE SHEET STEEL LAGGING, PAINTED ON BOTH SIDES WITH COATS OF RED LEAD AND ONE COAT OF APPROVED GUN PAINT ON THE OUTSIDE ONLY.
- THE DIESEL ENGINE EXHAUST AND ESCAPE PIPING, VALVES AND FITTINGS LOCATED IN POSITIONS WHERE EXPOSED TO THE HEAT OF OR SALT WATER SPRAY, SHALL NOT BE INSULATED OR LAGGED BUT SHALL BE COATED WITH AN APPROVED HEAT AND CORROSION RESISTING PAINT. SUITABLE GUARDS SHALL BE INSTALLED WHERE NECESSARY TO PROTECT PERSONNEL.
- WHERE STEAM HEATING PIPES PASS THRU BULKHEADS, THE COVERS SHALL HAVE SUFFICIENT CLEARANCE FOR EXPANSION OF PIPES. SEE DETAILS ON DRAWING NO. 445-3902-8.
- THE "SEE NOTE" FOUND IN "REMARKS" COLUMN IN THE ABOVE LIST OF BOILERS, MACHINERY AND MISCELLANEOUS EQUIPMENT REFERS TO THE STEAM END OF VARIOUS MACHINERY EQUIPMENT WHICH ARE SHIPPED COMPLETELY INSULATED AND LAGGED BY THE MANUFACTURER.
- MATERIAL FOR NON-REMOVABLE FLANGE COVERS ONLY IS ORDERED ON DWG NO. 445-3902-8.
- ALL INSULATION AND LAGGING MUST MEET THE REQUIREMENTS OF NO. 6 SPEC. 600 SECT. 530-1 OF JUNE 1, 1948 AND GEN SPEC. 580-1 OF MAY 1, 1938.
- THE 400 DOWN CORNER BOILER TUBES WHICH ARE INDICATED ON PORTSIDE, WARDROOM, COMP. PLAN AND WY. 400-900-0-0 BUREAU OF ENGRS. FIG. NO. 3000-000-00-00 TO BE COVERED WITH A SINGLE LAYER 1/4" THICK OF 870 AMBROSIO SECT. 01AL PIPE COVERING APPLIED DIRECTLY TO THE TUBE AND SECURED IN PLACE BY AT LEAST FOUR (4) LUGS PER SECTION WITH A CARBON ANNEALED HOT DIPPED GALV. IRON WIRE. ALL BEAMS TO BE POINTED UP WITH PLASTIC CEMENT NO. 6 SPEC. 33-1 TYPE "X" INSULATION TO BE LAGGED WITH ASBESTOS CLOTH NO. 6 SPEC. 33-1 TYPE "X" MODIFIED FIBER GLASS AND GUMMED ON USING BRASS INSERTED ASBESTOS TAPES NOT LESS THAN THREE (3) STITCHES PER INCH.
- FOR DD 645-0 INCLUDE FIBROUS GLASS TAPE (NO. 6 SPEC. 33-1B) IN LIEU OF ASBESTOS CLOTH FOR PIPE LAGGING, IN LINEAR QUANTITIES AS FOLLOWS: 4" WIDTH - 25,000 FT; 5" WIDTH - 35,000 FT; 6" WIDTH - 50,000 FT & 1 1/2" WIDTH - 70,000 FT.
- WHISTLE & BIRCH PIPING ABOVE MAIN DECK TO BE LAGGED WITH CANVAS & WATERPROOFED WITH ONE COAT OF "INSULKOTE" CEMENT OR EQUAL. FOR BOTTOM BUILT SHIPS ONLY.
- AN INSULATION OF WATER REPLENT AMBROSIO FELT 1/2" THICK OR EQUAL WRAPPED WITH A WATERPROOF AND FIREPROOF PAPER AND LAGGED WITH GLASS TAPES, SHALL BE SUBSTITUTED FOR HAIRFELT AND ASPHALT PAPER ON ALL L.P. WATER PIPING AND MISCELLANEOUS EQUIPMENT AS CALLED FOR ON THIS PLAN, IN ACCORDANCE WITH BU SHIPS LETTER 333-1/EN 22/42-11 (3-4-45) OF OCT. 15, 1942.

Insulation and Lagging Plan - DD 445-class destroyers, showing that insulation in the area of maintenance and repair access locations for engineering equipment will have removable pads of blankets (DD445-S3902-5).